

Journal of Information Systems Education

Summer/Fall 1996

The Expert Systems Course in AACSB Accredited Business Schools

ABSTRACT: This paper presents findings of an empirical investigation of the state of expert systems (ES) curriculum development in the 279 business schools accredited by the American Association of Collegiate Schools of Business (AACSB). One objective of this study was to determine the extent to which the introductory undergraduate ES course is being taught. A second objective was to obtain a profile of how ES is being taught. A questionnaire was developed to survey Information Systems (IS) faculty; the response rate was 41%. It was found that 48% of the schools offer an introductory undergraduate ES course. Additional highlights of the findings include: 44% of the schools have an ES component as part of other business courses; one or more graduate level ES courses are offered at 45% of the business schools; at 46% of the universities an ES course is offered outside of the business school.

KEYWORDS: Expert Systems Course, CIS Curriculum

INTRODUCTION An awareness of what is currently being in the past several years utilization of ES done in this new area of IS curriculum, by people in business and industry has. The findings can provide insight to grow rapidly. Along with this increase those who are teaching ES for the first in the use of ES in industry, some business time. IS curriculum planners will also business schools have recently added a find this information helpful as they course in ES. Those responsible for curriculum development in other business with the needs of business and industry. Schools are perhaps now exploring the **PREVIOUS ES** possibility of offering an ES course.

As the utilization of ES in business **CURRICULUM STUDIES** grows and the importance of ES as an in reviewing the literature for studies area of study for business students related to the ES course, it was found increases, it is worthwhile to survey business that in the last few years several authors business schools to determine the present have stressed the importance of teaching status of ES course offerings. Periodic in ES. Liebowitz [1,2] outlined course reviews of curricula and course content and described teaching are important if business schools are to methodology for the applied ES course. keep abreast of the needs of business The innovative methods for teaching and industry. the ES course that Liebowitz recom-

The purpose of this study was to determine the extent to which the less of their major, should be familiar introductory undergraduate ES course with the capabilities of ES. They out- is being taught. A second objective was lined a method for including ES in

to obtain a profile of how ES is being accounting, statistics, and quantitative taught in order to answer the question analysis.

"What are professors doing in their ES Yen and Tang [4] discussed the course?" impact of ES on existing IS courses such

Results of this research will be of as systems design, data base, graphics, interest to three groups. Both business decision support systems (DSS), data and academic communities should have communication and office automation.

Faye P. Teer

Information and Decision Sciences Department

James Madison University Harrisonburg, VA 22807 Office 540-568-3054 teerfp@jmu.edu

Yen and Tang emphasized that all IS instructors must keep abreast of the current ES technology since we must familiarize all IS students with emerging technology trends.

Keen [5] examined trends pertaining to ES education and concluded that "ES are acknowledged as useful tools in the business world, yet business education has ignored AI. Keen did not cite any empirical investigation of the extent of ES course offerings. Is Keen's conclusion "business education has ignored AI" presently the case? In the related literature only two empirical studies on the extent of ES course offerings were found. However, both of these studies, which are described next, examined only graduate level ES course offerings.

Chong, Park, and Wong [6] stated, "Currently, most business schools are still in an embryonic stage in the development of their expert system curricula. ..." Survey data from U.S. MIS departments indicated that 36 respondents, 80%, from the doctoral programs surveyed included at least one ES course. However, only nine departments required the course. Seventy-eight percent of the respondents at the doctoral programs not presently offering an ES course stated that they intended to add it to their curricula within two years.

Wong and Chong [7] surveyed 38 faculty from U.S. universities that offer

Summer/Fall 1996

doctoral programs in accounting.

Results indicated that half of the universities had at least one ES related course in their graduate accounting curricula. However, it was found that no accounting schools had a course in their graduate accounting curricula which specifically focused on ES.

Recently, Liebowitz sounded a call to action for those who teach ES concerning a primary component of the ES course, knowledge acquisition. He maintains that in order to advance the state-of-the-art in expert systems technology educators need to be giving students a stronger foundation in the methodologies and tools used in acquiring knowledge. Liebowitz discussed why better education of prospective knowledge engineers in the area of knowledge acquisition is so important and described some innovative teaching techniques. [8]

As ES technology has matured over the past decade and today ES activities are prevalent worldwide. [9] However, Liebowitz maintains that skeptics of ES technology still exists and many ES fail due to a lack of commitment or alack of awareness by management. Liebowitz believes that as educators we need to be more proactive in integrating ES concepts throughout the undergraduate curriculum for those students who will be developing the knowledge organizations of tomorrow. [10]

THE STUDY

To obtain empirical information regarding the extent of current and planned ES course offerings, IS faculty from 279 AACSB accredited undergraduate business schools were surveyed. Questionnaires were mailed to business school deans who were asked to forward the questionnaires to appropriate IS faculty for completion. Respondents who stated that their university currently offered an introductory undergraduate ES course were also asked to answer numerous questions pertaining to the

ES course background and course content.

One hundred and fifteen completed and usable questionnaires were received

after one mailing which yielded a response rate of 41 %. The results from these questionnaires are presented in two sections: extent of course offerings and profile of how the ES course is taught.

EXTENT OF COURSE OFFERINGS

The ES course was defined as being a course that is primarily ES, although it may contain additional components such as DSS or Artificial Intelligence (AI). Forty-four percent, 51 respondents, said that such a course is presently offered within their business school. An introductory undergraduate ES course is not offered at 56% of the business schools.

The respondents at the 64 universities not offering an introductory undergraduate ES course were asked about their future plans. Seven percent, four respondents at business schools not offering an ES course prior to summer '93, stated that their school's first ES course would be offered during summer/fall '93 or spring '94. These four respondents were added to the 51 respondents who said the course was offered within their business school. These 55 respondents bring the percentage of schools presently offering an introductory undergraduate ES course within the business school to 48% and the percentage of schools not offering this course to 52%. Thirty-two percent said the course was under consideration, but there were no immediate plans to offer the course. Table 1 summarizes these results.

When respondents were asked the

title of the introductory undergraduate ES course at their university, 15 said

"DSS and ES." DSS was the second most popular title with four responses. At three responses each, the third most frequent response was "ES in Business" and "ES." The remainder one of a kind names indicated a variety in course titles.

The extent to which an "ES component" is taught as part of other courses (beyond the introductory CIS survey course) within the business school was determined. Fifty-four percent stated that an ES component is not included in other business courses. Forty-four percent responded that an ES component is taught in other business courses. Two percent did not know.

Respondents from schools where an ES component is taught in other business courses were asked which courses contained an ES component. The most frequent title "MIS" was given by 13 respondents. "DSS" was the next most frequent answer with nine responses.

To learn the extent to which the ES course is being offered in programs such as computer science and engineering, respondents were asked if an ES course is offered outside the business school at their university. Fifty respondents, 46%, stated that an ES course is offered outside the business school, 43% responded no, and 11% responded do not know. Respondents from the 50 schools in which ES is taught outside of the business school were asked to identify the programs in which the ES course is taught; Computer Science was identified by 44 respondents and four respondents said that ES was taught in the engineering school at their university. Sixty percent responded that the ES course taught outside of the business school was open to business students

TABLE 1 Introductory Undergraduate Expert Systems Course in AACSB Business Schools

Responding Affirmatively Number Percent

Offering ES course prior to summer '93 51 44 ES course offered for first time in summer/fall '93 or spring '94 4 4 Total offering ES course 55 48 Total not offering ES course 60

52 Of those not offering ES course, have ES course under consideration 19 32

and 40% said business students were not allowed to enroll in the ES course. A summary of responses is given in Table 2.

The extent of graduate level ES course offerings within the business school was determined. Forty-five percent of the business schools in the sample group offer one or more ES courses at the graduate level. Fifty-four percent do not offer a graduate level ES course and one percent of the respondents stated do not know. Within the business schools offering a graduate level ES course, 76% offer one course, 8% offer two courses, 6% offer 3-4 courses and 10% did not know.

PROFILE OF ES COURSE This section presents findings relating to the second objective of this study- determining how the ES course is being taught. The findings are based on answers from respondents at the 51 business schools that were offering their ES course prior to the summer of '93. Ten percent of the business schools have offered an undergraduate ES course for one year or less. Sixty-five percent have offered the course for two through four years; 25% have offered the course five or more years. The majority, 69%, offer the course at the senior level; 31%, allow juniors to enroll. For 63% of the schools ES is not a required course. Of the 37% of the schools requiring the ES course, 89% require it as part of the CIS/MIS/IS major and 11% require it for the DSS major.

Respondents were asked to identify all of the prerequisites for their introductory undergraduate ES course taught in the business school. Eighty-two percent of the respondents identified the introductory level CIS/MIS course as a prerequisite. Forty-one percent said that a junior/senior level MIS course was a prerequisite. Systems Analysis and Design was named by 29% as a prerequisite. Twenty-four percent of the schools require Database as a prerequisite. Junior class status is a prerequisite at 37% of the schools. Some type of computer language was stated as a

Summer/Fall 1996

prerequisite by 47% of the respondents. Of the 24 schools with a language prerequisite, 14 require COBOL, four require C, two require Pascal and two require BASIC. The following languages were each named once as a prerequisite at various schools: Quick Basic, C++, COBOL II, any third generation language, and any language. One hundred percent of the respon-

dents whose business schools offer an ES course stated that students are required to obtain hands-on experience in developing an ES project. Thirty-two percent of the respondents' ES courses incorporate an individual project; 36% use a group project; while 32% use both an individual and group project. When asked specifically if students obtain hands-on experience using an ES

TABLE 2 Expert Systems Course Offered Outside the Business School -

Yes (44 of 50 schools have an ES course in the Computer Science Program) No
Do Not Know

Number 50 47 12
Percent 46 43 11

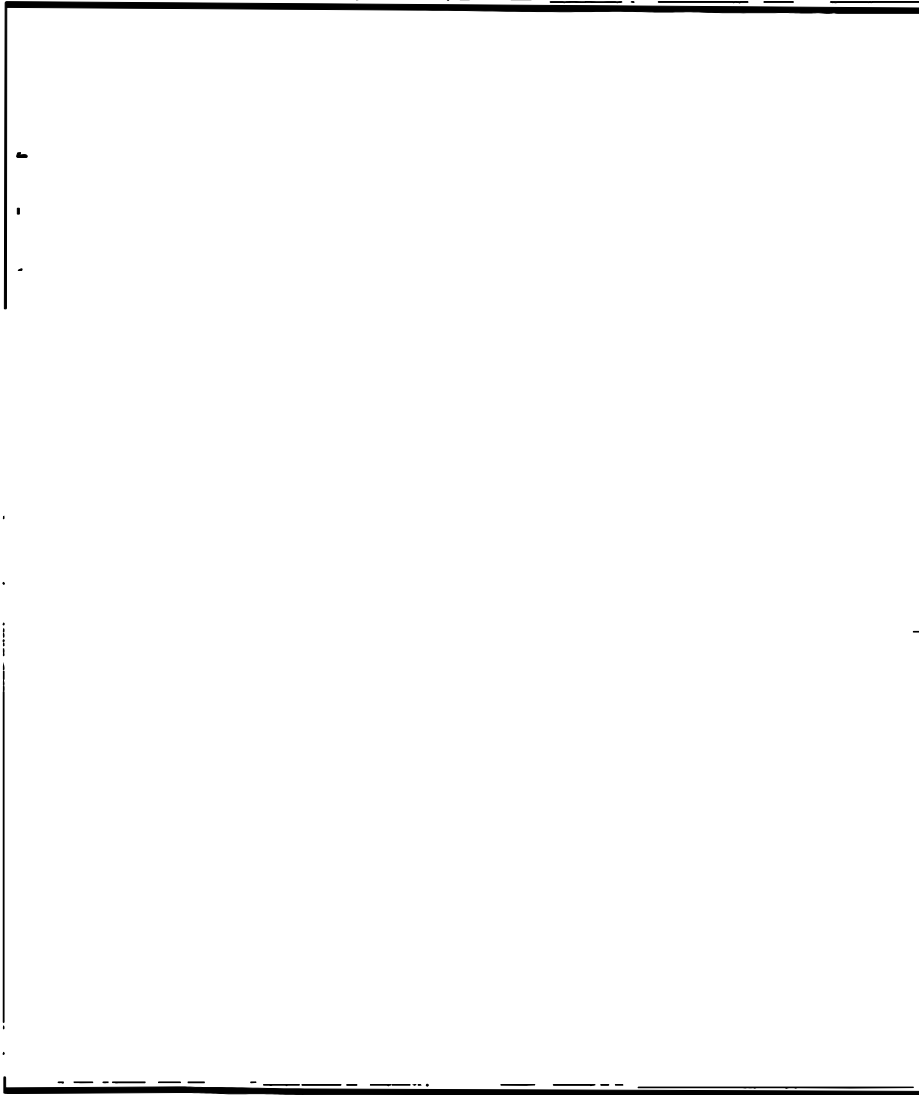


TABLE 3 Profile Of How The Introductory Undergraduate Expert Systems Course Is Being Taught --

Years Course offered Number Percent 1 or less 5 10 ?-4 33 65 More than 4 13 25 Level at which course is taught

Junior 16 31 Senior 35 69 ES course required for major

Yes 19 37 No 32 63 If required, by what major

CIS/MIS/IS 17 90 DSS 2 10 Prerequisites

Intro CIS/MIS 42 Junior/senior level MIS course 21 Systems Analysis and Design 15 Database 12 Junior class status 19 Language (*COBOL given most frequently*) 24

Hands-on ES project required 51 Individual project 16 Group project 18 Both 16 ES shell used 49

VP-Expert 30 EX-SYS 17 Student version 28 Full version 24 Outside speakers as guest lectures 16 Additional undergrad ES course 3

82 41 29 24 37 47 10C

32 36 32 96 61 35 57 49 31 6

shell as part of the course, 96% said yes. Of the students who obtained hands on experience with ES shells, VP-EXPERT and EX-SYS was used by 61% and 35% respectively. Level-5, Ist-Class, AES, Nexpert Object, Guru, Pro Kappa, Mahogany, MI, CUPS, and ART-In were also mentioned. Respondents were asked if their business schools offered an additional undergraduate course(s) in ES beyond the introductory course. Only six percent, three schools, did offer an additional ES course. Table 3 summarizes

the findings that create a profile of how the introductory undergraduate ES course is being taught in AACSB accredited business schools.

Faculty members were asked, "What textbook(s) and/or software is used in your introductory undergraduate ES course?" The textbook responses given by two or more of the respondents are summarized in Table 4.

When asked what software was used in the introductory ES course, VP-EXPERT followed by EXSYS was cited most frequently. An alphabetical listing of all of the software cited by respondents is given in Table 5.

Faculty who taught the course were asked what percentage of the total class grade they assigned to course activities such as tests, research papers, major projects and other assignments. Table 6 lists the mean percentage given for each component of the total course grade.

Respondents specified the approximate percentage of the course devoted to ES and several related topics. Table 7 indicates the mean percentage of coverage for each course topic.

Faculty members were asked to indicate the approximate number of classroom hours they spent on ES course topics. Table 8 shows a list of ES topics and the percentage of respondents for each amount of classroom hours devoted to a particular topic during one semester.

Under other topics on which classroom hours are devoted respondents mentioned project development lab, object oriented programming, fuzzy logic, objects, hands-on shell, neural

Summer/Fall 1996

networks, AI, DSS, reasoning, project, software, system integration, interface design, guest speakers, ethics, feasibility studies, management issues, and political issues.

DISCUSSION

It was found that 48% of faculty from schools participating in this study stated that their business school offers an introductory undergraduate ES course. Not counting the introductory CIS class, 44% of the business schools include an ES component as part of other business courses. The ES component is primarily being included in MIS and DSS courses. The graduate level ES course was found to be almost as prevalent as the undergraduate course; one or more graduate level ES courses are offered at 45% of the business schools.

The findings indicate that the ES course is also taught outside the business school. Forty-six percent of the respondents stated that the ES course is offered outside the business school. Thus, the ES course is just about as widely offered outside the business school as within.

For the business schools offering the ES course for the first time prior to summer of '93, 65% of the courses have only been in the curriculum for two to four years. The results of this study confirm that in recent years there has been a large increase in the number of business schools offering the introductory undergraduate ES course. In addition, 32% of the faculty at schools not offering the ES course stated that adding an ES course to the curriculum was under consideration. Based on the importance of ES as an area of study as cited in the

literature and the empirical evidence of the ES course being under consideration at many schools, it is anticipated that the growth of ES course offerings will continue for the near future.

AUTHOR'S BIOGRAPHY Dr. faye Teer is a Professor in the Information and Decision Sciences Department at James Madison University. In addition to the ES course, she teaches statistics and has served as assistant dean in the College of Business. She received her Doctor of Business Administration from Louisiana Tech University in 1985.

REFERENCES

- 1 Liebowitz, J. (1993) *Teaching a Course in Applied Expert Systems*, PC AI, January/February, Vol 17, pp 32-33.
- 2 Liebowitz, J. (1992) *Teaching an Applied Expert Systems Course: A Content Outline*, JOURNAL OF INFORMATION SYSTEMS EDUCATION, Vol 4, pp 5-10.
- 3 Moen, D., J. Powell, and T. Davies. (1992) *Introducing Expert Systems Into the Business School Curriculum*, JOURNAL OF EDUCATION FOR BUSINESS, November, Vol 168, pp 92-100.
- 4 Yen, D. and H. Tang. (1988) *An Investigation of Expert Systems' Impacts on the Management Information Systems Discipline*, JOURNAL OF RESEARCH ON COMPUTING IN EDUCATION, Winter, Vol 21, pp 165-173.
- 5 Keen, J. (1991) *Artificial Intelligence: Foundations, Trends, and Issues*, BUSINESS EDUCATION FORUM, December, Vol 46, 25-27.

TABLE 4 Textbooks Mentioned by Two or More of 48 Respondents

Title of Textbook	Author(s)	Number	Percent
Decision Support and Expert Systems	Turban	19	40
Developing Knowledge Based Systems Using VP-Expert	Dologite	5	10
Expert Systems for Business	Pigford and Baar	4	8
Decision Support and Expert Systems	Olson and Courtney	4	8
Introduction to Expert Systems	Ignizio	3	6
Intelligent Systems for Business	Zahed	3	4
Management Support Systems	Turban	2	4
Expert Systems and Applied Artificial Intelligence	Turban	2	4

Summer/Fall 1996

6 Chong,J.,J. Park, and B. Wong.

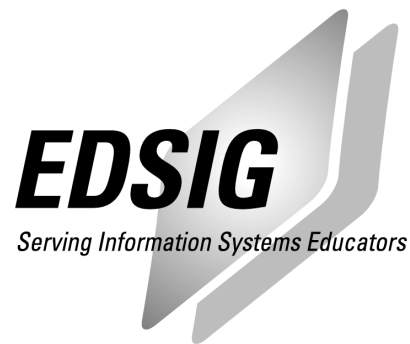
(1990-1991) *Curriculum Development of Expert Systems in Management Education: A National Survey of Doctoral MIS Departments*, THE JOURNAL OF COMPUTER INFORMATION S~MS, Winter, Vol XXI, pp 24-27.

7 Wong, B. andJ. Chong. (1992) *Expert Systems in Accounting: A National Survey of Doctoral Accounting Schools*, JOURNAL OF EDUCATION FOR BUSINESS, January, Vol 67, pp 156- 159.

8 Liebowitz,J. (1993) *TheNeedFor Better Educating Prospective Knowledge Engineers on Knowledge Acquisition*, JOURNAL OF COMPUTER INFORMATION S~MS, Fall, pp 37-41.

9 Liebowitz,J. (1995) *The Second World Congress on Expert Systems: A Review*, EXPERT S~MS WITH APPLICAnoNs, January, Vol 8, No 1, pp 229-230.

10 Liebowitz,J. (1995) *Expert Systems: Dead or Alive?*, EDUCATIONAL TECHNOLOGY, March-April, Vol 35, pp 53-55.



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.

ISSN 1055-3096