ASSESSING COMPUTING LITERACY OF BUSINESS STUDENTS IN A REGIONAL UNIVERSITY: PROSPECTS FOR THE 90s

Dr. Minoo S. Amini
Ball State University
Department of Urban Planning
Muncie, Indiana 47306-0315

ABSTRACT: The requirements of computing literacy for business students who are not majoring in Management Information Systems (MIS) are changing. A survey was conducted to explore the impact of MIS courses on the perceived computing literacy of the business students in a regional university. The findings suggest that on a broader scale MIS courses provided the basis for the students to become computing literate. The majority of students applied their computer skills to other courses and of those who worked, more than half utilized their computer skills in their current job. However, students' self-reported knowledge of software such as data communications and programming languages was quite low, an indication that the MIS curriculum is modeled after the conventional system emphasizing microcomputer applications packages, a system which is rapidly becoming obsolete. In addition, the contradiction observed in the responses of students regarding their perception of computing literacy and their reported knowledge levels warrants attention. Specifically, while over 70% of the students evaluated themselves as being computing literate, their confidence of their knowledge of hardware and software was quite low. Regional universities may need to re-examine their curriculum offerings in accordance with the demands of industry and changing needs of the workforce, in order to prepare graduates to meet those demands. This need is emphasized in the light of the role these universities play in providing educational opportunities for the communities surrounding them.

KEYWORDS: CIS Education, Computing Literacy, MIS Curriculum

INTRODUCTION

The 1990s is the decade of maturity and transformation for management information systems (MIS) departments. Increasing pressure is placed on these programs to offer courses that meet the industry and business community needs. Businesses, frustrated with the qualifications of the new graduates, complain that business graduates are not well prepared to deal with the expectations and opportunities of the new environment of information systems [1,2].

With the expansion of microcomputer courses, MIS departments have had the primary responsibility for teaching computer literacy courses emphasizing software packages such as wordprocessing, electronic spreadsheets and databases to business students. According to Chacko (1990), almost 58% of the microcomputer courses taught in AACSB accredited universities and colleges in the United States are offered in MIS oriented departments. The problem, however, is that most course offerings were implemented prior to 1985, with minimal revisions consistent with prevailing computing applications in the business world [3].

In addition, while they continue to serve as the source of information systems know-how, other business disciplines have begun integrating information technology into their curricular offerings. As a result, the domain of MIS teaching has expanded to other departments [4]. Recently, however, a few leading business schools have begun to explore the relationships between business needs and their MIS programs. The standard micro-computer or "computer literacy courses" offered through MIS programs are being replaced with courses dealing with problem-solving techniques and focusing on actual day-to-day business practices.

Hands-on training courses are offered in business communications, database

management, telecommunications and networking [5]. More important, some MIS departments have started to establish cooperative educational programs with local businesses to provide students with experience in applying information technology to support the business [6].

While schools with strong MIS departments may be able to cope with demands for change, the adjustment problem is more acute at smaller universities and colleges. The majority of MIS programs are quite young and lack the experience and resources available to larger programs. Pressured by dwindling enrollments, budget problems, and lack of qualified faculty, MIS programs in these institutions struggle for survival. If they are to survive they have to make their programs more relevant by adopting creative strategies to strengthen their instructional base.

PURPOSE

A major problem facing MIS as an academic discipline is adaptation to the demands of industry and changes in the work force. Curriculum offerings need to be re-examined and linked to industry and economic development objectives of the community. A basic understanding of computer hardware, software and hands-on experience of popular software packages as currently taught in computer literacy courses will no longer be sufficient. According to Day and Athey (1989), MIS departments, having the major responsibility for educating business students in the field, should improve the marketability of the graduates by changing their focus from computer literacy to what they call computing literacy.

While computer literacy is vaguely defined to be the general computer education needed by business students to function in an information society, computing literacy offers more specific directions. Students do not need to know the inner components of the computers, but it is necessary for them to understand the new emphasis on organizational computing that links information systems to competitive advantage [1]. That is, the general computer related courses designed for business students should be geared toward increasing their ability to use the computer as a tool to enrich their professional and personal life, thus the term "Computing Literacy." In this context, computing literacy should be the educational goal for most students [7]. Specifically, Day and Athey identify five complementary levels required in gaining and retaining computing literacy which addresses basic academic and employability skills of students:

1. Understanding the role of the computer in society;
2. Being comfortable with computers as machines;
3. Using computers as tools to support routine business activities;
4. Understanding the advantages/ disadvantages of computers;
5. Gaining some knowledge of programming, and developing the ability to design computer applications [7].

A major problem facing MIS as an academic discipline is adaptation to the demands of industry and changes in the work force. Curriculum offerings need to be re-examined and linked to industry and economic development objectives of the community.

The objective of this exploratory research is to assess the impact of the MIS program on the computing literacy of business students in a regional university. Specifically, the research will focus on items 3 and 5, above. The evaluation is necessary in order to improve these programs as well as to provide better educational opportunities for the communities surrounding the universities in which the programs are based. The implications of the study are important to business school administrators interested in the development of degree programs in MIS, to accreditation organizations and to business recruiters.

METHODOLOGY

Data were gathered from a survey conducted in two sections of an introductory MIS course at the University of Southern Mississippi, College of Business Administration. The course, the second information systems core requirement of all business majors, covered the social implications of information society, organizational and technical foundations of information systems and a hands-on module using dBASE IV. The prerequisite was a dedicated software literacy course in which students were taught microcomputer applications in the areas of DOS operating system, word processing and spreadsheets.

After a review of the literature a 22-item instrument, composed of four sections, was generated and distributed to a sample comprised of 128 students in their junior and senior years [8,9,10,6].

A copy of the questionnaire has been included in Appendix A. The first section included items concerning student profiles, computer resources and prior computer skills. The second section included items to measure the students' perceived level of familiarity with, and the extent of usage of the application programs. Finally, items in the third section included questions to assess students' self-perceived computing literacy. The survey was administered at the end of Fall semester 1991-92.

In summary, the objectives of the questionnaire used in the survey were as follows:

1. To investigate computer knowledge of the students before entering school.
2. To explore the impact of MIS courses on computing literacy. Subsequently, the following points were tested:
   a. To assess the students' familiarity with computer

hardware, software and programming.

b. To examine the extent to which they apply their computer knowledge to other courses and their job.

c. To determine their perception of their own computing literacy and the extent to which they apply their skills to non-school activities.

RESULTS OF THE SURVEY

Student Profiles, Computer Resources and Skills

Of the 123 usable questionnaires analyzed for this study, 60 (48.8%) were completed by males and 63 (51.2%) by females. Seven emphasis departments were represented by students, and the average age of the respondents was 23, with a standard deviation of 5.5. About 39% entered USM directly from high school, 44.5% from community colleges and 16.8% from other universities. When asked where they currently had access to a computer/ microcomputer, 83% said school, 39% home and 28.5% work.

The majority of the students (82.9%) had used computers prior to entering the university. Subsequently, they were asked about their knowledge of the software packages before entering USM. Their responses to the question showed that more than 70% of them had taken a course on computer concepts, and 36.7% indicated a knowledge of computer programming. In terms of their familiarity with application programs, word processing received the highest rank (68.9%), spreadsheets were second (45.5%), databases third (28%), with statistical/accounting and data communications being the last in rank (See Figures 1 and 2).

Figure 1: PROFILE, COMPUTER RESOURCE, AND PRIOR SKILLS
Percentage of Respondents

Participants (%responding)	96.0
Males	48.8
Females	51.2
Entered USM From:	
High School	39.0
Community College	44.5
Other Universities	16.8
Access to Computer	
At School	83.0
At Home	39.0
At Work	28.5
Prior Computer Knowledge	82.9

Figure 2: PRE AND POST FAMILIARITY WITH SPECIFIC SOFTWARE

Specific Application	Percent Pre	Percent Post
Wordprocessing	68.9	77.9
Spreadsheets	45.5	77.7
Database	28.0	75.2
Stat/Accounting	15.4	21.4
Data Communication	11.3	10.3

Post-University Computer Knowledge

Respondents were also asked to identify the software packages they had learned after entering USM. The purpose of the inquiry was to compare students' prior knowledge of the application programs with computer skills acquired while attending the university. Accordingly, as reported in Figure 2, wordprocessing received the highest score (77.9), spreadsheets were second (77.7), database was third (75.2), statistical/ accounting was fourth (21.4) and, finally, data communication received the lowest score (10.3).

To examine whether the differences were statistically significant, a t-test was conducted to compare the means of responses before and after entering school. The calculated t-values were significant at the 0.05 level for spreadsheets (4.85), database (3.89), and stat/accounting (1.68), indicating that students' skills in using these systems increased significantly after entering school.

The students were also asked to rate their familiarity with the above application programs on a scale of 1 to 3, ranging from very familiar to least familiar. The mean values shown in Figure 3 indicate the measure of the students' familiarity with the use of the five programs.

Wordprocessing, with a mean value of 1.4, indicated the highest degree of familiarity, whereas data communication software received the lowest measure, exemplified by a mean value of 2.6. Spreadsheet and database packages were in a middle position indicating a fair degree of familiarity.

Furthermore, when asked if they had applied their computer skills in other courses, 86.8% of the students responded positively. Of those who said yes, the application program used most frequently in other courses was word processing, as indicated by the mean value of 2.3 in Figure 4. Statistical/Accounting and

Figure 3: POST-UNIVERSITY FAMILIARITY WITH APPLICATION SOFTWARE

Application	Level of Familiarity (%) Very Familiar	Familiar	Least Familiar	Mean Level of Familiarity
Wordprocessing	65.0	30.9	4.1	1.4
Spreadsheets	34.1	53.7	12.2	1.8
Database	57.4	32.0	10.4	1.9
Stat/Accounting	14.0	28.9	57.0	2.4
Data Communication	10.7	19.0	70.2	2.6

(Ranking Scale: 1 = Very Familiar, 3 = Least Familiar)

Figure 4: USAGE LEVEL OF APPLICATION SOFTWARE IN OTHER COURSES

Application	Level of Usage (%) Occasionally	Frequently	Very Frequently	Mean Level of Usage
Wordprocessing	21.2	27.9	51.0	2.3
Spreadsheets	52.0	36.7	11.2	1.6
Database	89.6	7.8	2.6	1.2
Stat/Accounting	61.3	18.8	20.1	1.7
Data Communication	75.0	13.9	11.1	1.4

(Ranking Scale: 1 = Occasionally; 2 = Frequently; 3 = Very Frequently)

spreadsheets showed very close mean values, and were rated second among the application programs most frequently used in other courses.

Finally, the respondents were asked to indicate whether they worked, and if they did to identify the type of computer applications used on their job and rate the extent of their use on a scale of 1 to 3, from occasionally to very frequently. Out of 69.7% who said they work while attending school, about 53% responded that they apply their computer skills at their present job. Figure 5 on the following page presents the results on the frequency of usage of each package.

The mean values in the last column of Figure 5 indicate that wordprocessing was the most frequently used package at work with a mean of 2.3. Other packages had very close mean values, placing them second in rank, collectively. In response to the question of whether their present employment has been enhanced by computer skills acquired at school, more than 41% of the students agreed, 15.4% strongly agreed, and 43.6% disagreed.

Perception of Computing Literacy

Students were asked a number of questions for the purpose of assessing their perceptions of their computing literacy (See Figure 6). The first question was whether they consider themselves to be computing literate. While about 74% responded positively to being computing literate, their responses to subsequent questions indicated that only 41% were comfortable with their knowledge of hardware, and 38.5% with computer software.

Similarly, when asked to rate their knowledge of programming languages, the response rates were quite low; only 21.3% responded positively. Of those who said "yes" to the question, the language most frequently mentioned was BASIC (14.8%), with PASCAL second (8.2%) and FORTRAN third (5.7%).

SUMMARY AND CONCLUSIONS

The main purpose of this investigation was to assess the computing literacy of business students who were not majoring in information systems at a regional school. The findings indicated significant increases in the perceived computing skills of students subsequent to MIS coursework, particularly in the area of spreadsheets, database, and stat/accounting programs. The higher skill levels observed suggest a positive impact of the program. However, the students' familiarity with more advanced topics such as data communication, and programming languages were quite low, an indication that the MIS program of the school studied here is modeled after the conventional system, i.e., basically following the standard microcomputer courses taught in U.S. and Canadian business schools.

The findings also suggest that on a broader scale, MIS courses offered to this sample provided a basis for the students to become computing literate. The importance of computing literacy is indicated by the level of application of computer skills outside the MIS course setting [7]. That is, the majority of students applied their computer skills in subsequent coursework, and of those who were employed, more than half utilized computer skills at work. Thus, the assumption is that business students are becoming adept at delivering outputs from their computers which will lead to greater productivity in their future professional life.

A question remains, however, as to the degree to which businesses will continue

training and development programs in information systems from the point at which MIS programs leave off. Another question is, what basic skills are needed by business and industry? A review of the literature on business perspectives of business graduates reveals a great deal of dissatisfaction regarding inadequate training in both technical and organizational areas [11,12,13]. Two conflicting expectations are observed by campus recruiters: Demand is increasing for broadly educated business graduates by those companies that plan to implement the state-of-the-art computer technology for the 21st century, while there is still a great demand for business graduates with traditional business training [1]. Consequently, what and how much business majors need to know about computers/ information systems depends on the level of integration between business and academia.

To facilitate cooperation and integration, it is necessary to determine how to bridge the communication gap between the two sectors so that the strategic objectives of industry can be linked to the mission of the university and curriculum design. It seems that cooperative efforts are feasible and most productive at the micro level where local businesses, industries and universities could formulate common strategies regarding labor force training and development.

One indication for further study is the possible need to design MIS programs individualized to address unique local/ regional concerns, thereby precluding the adoption of a single curriculum across all schools. Although this study verifies that MIS programs have had a positive impact on business students, these programs can be improved by addressing more specifically the current needs of business and industry. Whether majoring in MIS or not, business school graduates can thereby be prepared to excel in the fast-changing environment of information systems.

Figure 5: EXTENT OF USAGE OF APPLICATION SOFTWARE AT WORK

	Extent of Usage (%)			
Application	**Occasionally**	**Frequently**	**Very Frequently**	**Mean Level of Usage**
Wordprocessing	24.0	34.0	42.0	2.3
Spreadsheets	44.4	33.3	22.2	1.9
Database	60.0	15.0	25.0	1.8
Stat/Accounting	64.1	17.9	18.0	1.7
Data Communication	52.5	22.5	25.0	1.9

(Ranking Scale: 1 = Occasionally; 2 = Frequently; 3 = Very Frequently)

Figure 6: PERCEPTION OF COMPUTER LITERACY

	Percentage of Respondents
Computing Literate	74.0
Comfortable With Knowledge of	
Hardware	41.0
Software	38.5
Programming	21.3
Languages Most frequently Mentioned	
BASIC	14.8
PASCAL	8.2
FORTRAN	5.7

REFERENCES

1. Leitheiser, R.L. "MIS Skills for the 1990's: A Survey of MIS Managers' Perceptions," Journal of Management Information Systems, Summer 1992, Vol. 9, No.1, pp. 69-91.
2. Richardson, T. and R. Yellen. "Quality in Information Systems Education: Do Alumni Perceive that Corporate Input is Beneficial?," The Journal of Computer Information Systems, Spring, 1992, pp. 24-28.
3. Chacko, C. and A. Mercure. "Microcomputer Courses in US and Canadian Business Schools: The State of the Art," Interface: The Computer Education Quarterly, Vol. 12, No.1, Spring 1990, pp. 10-22.
4. Steerey, L.M., S. Smith, and J.R. Tanner. "Information Systems Computing in the Business Curriculum: A Multidisciplinary Perspective," Interface: The Computer Education quarterly, Vol. 7, No.1, 1989, pp. 69-75.
5. McWilliams, G. "New Lesson Plan for College," Business Week. October 25, 1991, pp. 144-145.
6. Turner, J. A. "Familiarity with New Technology Breeds Change in Computer-Literacy Courses," Chronicle of Higher Education, July 1987.
7. Day, J.C. and T. Athey. Microcomputers and Applications, Second Edition. Scott, Foresman/ Little, Brown Higher Education, 1989.

8. Harrison, A. W. and R. K. Rainer, Jr. "The Influence of Individual Differences on Skill in EndUser Computing," Journal of Management Information Systems, Summer 1992, Vol. 9, No. 1, pp. 93-111.
9. Khan, M.B. and L.M. Jessup. "Computer Literacy of Incoming Undergraduate Business Majors," The Journal of Computer Information Systems, Summer 1991, pp. 13-17.
10. Sein, M.K., Bostrom, R.P., and Olfman, L. "Training End-Users to Compute: Cognitive, Motivational and Social Issues," INFOR, 25, 3, 1987, PP. 236-252.
11. Rifkin, G. "Top Students Shunning MIS," Computerworld, June 1987, pp. 120-121.
12. Wiersba, R. K. "Business Information Systems in Transition: The Challenge for Academia," The Journal of Computer Information Systems. Vol. XXXII, No.2, 1991-1992, pp. 50-54.
13. Dwyer, K. E., "The Buck Stops Here," Computerworld, September 7, 1992.

AUTHOR'S BIOGRAPHY

Minoo Amini is Assistant Professor in the Department of Urban Planning at Ball State University. She received her Master's from the University of Michigan and Ph.D. from Michigan State University. Her current research interests focus on economic development,CIS education, group communication support systems, and the environmental impact of information technology.

Appendix A: COMPUTING LITERACY SURVEY

Please fill in the following questions completely and to the best of your ability. Each answer will be evaluated to determine future class projects in MIS courses.

Section I: General

1. Gender: ☐Female ☐Male
2. Age:
3. Major:
4. From where did you enter USM?
   - ☐ High School
   - ☐ Community College
   - ☐ Other University
5. Do you have access to computer/microcomputers?
   - ☐ no
   - ☐ yes, at school
   - ☐ yes, at work

Section II: Prior Computer Skills

6. Have you ever used a computer/microcomputer before entering USM?
   ☐no ☐ yes

   What computer skills did you have before entering USM?
7. Introduction to computer concepts?
   ☐ no ☐ yes
8. Introduction to computer programming?
   ☐no ☐ yes
9. Introduction to hands-on applications:

a. Word processing	☐ no	☐ yes
b. Spreadsheets	☐ no	☐ yes
c. Database Management	☐ no	☐ yes
d. Statistical/accounting	☐ no	☐ yes
e. Communication	☐ no	☐ yes
f. Other	☐ no	☐ yes

Section III: Post-University Computer Skills

10. Which of the following software packages have you learned to use at USM?

a. Word processing	☐ no	☐ yes
b. Spreadsheets	☐ no	☐ yes
c. Database Management	☐ no	☐ yes
d. Statistical/accounting	☐ no	☐ yes
e. Communication	☐ no	☐ yes
f. Others	☐ no	☐ yes

11. Please rank your computer skills/knowledge of the following software programs:
(Please rank in order from 1 to 3; 1=very familiar, 3=least familiar)

a. Wordprocessing	1	2	3
b. Spreadsheet	1	2	3
c. Database	1	2	3
d. Statistical/accounting	1	2	3
e. Communication	1	2	3
f. Others	1	2	3

Section IV: Perception of Literacy

12. Do you consider yourself computer literate?
☐ no ☐ yes

13. Are you comfortable with your knowledge of computer software?
☐ no ☐ yes

14. Are you comfortable with your knowledge of computer hardware?
☐ no ☐ yes

15. Have you taken any programming courses at USM?
☐ no ☐ yes

16. If yes, please check the language(s) you have learned.

a.	Fortran	d.	Pascal
b.	Cobol	e.	C
c.	Basic	f.	Other

17. Have you applied your computer skills in other courses?
☐ no ☐ yes

18. If yes, please circle on a scale from 1 to 3 the level of usage
(Please rank in order from 1 = occasionally, 2 = frequently, 3 = very frequently)

a. Wordprocessing	1	2	3
b. Spreadsheet	1	2	3
c. Database	1	2	3
d. Statistical/accounting	1	2	3
e. Communication	1	2	3
f. Other	1	2	3

19. Do you work while attending USM?
☐ no ☐ yes

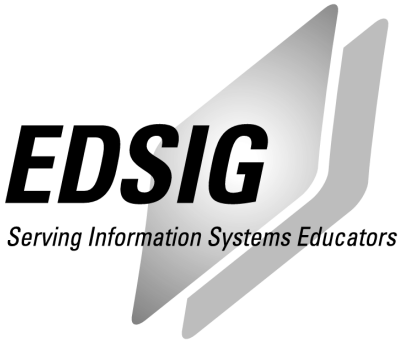
20. If yes, have you applied your computer skills acquired at U.S.M. at your present job?
☐ no ☐ yes

21. If yes, please circle on a scale from 1 to 3 the level of usage
(Please rank in order from 1 = occasionally, 2 = frequently, 3 = very frequently)

a. Wordprocessing	1	2	3
b. Spreadsheet	1	2	3
c. Database	1	2	3
d. Statistical/accounting	1	2	3
e. Communication	1	2	3
f. Other	1	2	3

22. Has your present employment been enhanced by computer skills acquired at USM?
Please check the response that represents the way that you feel.
☐ Disagree ☐ Agree ☐ Strongly agree

Information Systems & Computing
Academic Professionals



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.

ISSN 1055-3096