Recommended Computer End-User Skills for Business Students by Inc. 500 Executives And Office Systems Educators

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Abstract

Sixty-three Inc. 500 executives and 88 office systems educators at the college level completed a questionnaire that solicited their recommendations of the computer end-user skills business students need now and by the year 2000. The findings indicate that 20 end-user skills were "strongly recommended" and 43 end-user skills were "recommended" by both educators and executives. Such findings provide rich information for improving computer education programs for business undergraduates.

Small businesses employ 53% of the private work force, contribute 47% of all sales in the country, are responsible for 50% of the private gross domestic product, and produced 75% of the 2.5 million new jobs during 1995, as shown in the latest statistics (U. S. Small Business Administration, 1996). The SBA (1996) reported that small businesses provided virtually all of the net new jobs between 1991 and 1995. As the number of small businesses and their impact on the economy increases, the nature of their need for employees with computer skills must be documented in order for educators to appropriately plan educational experiences for the students who will work in small businesses.

A review of the literature reveals little recent research that documents the computer hardware and software skill requirements of small business employers. However, Small Business Reports (1992) reported a growing demand for and a diminishing supply of applicants with sufficient computer skills.

Although small businesses have been relatively slow to use computers, Arnst (1996) reported that 70% of small businesses now own personal computers; of that number, 20% have networks and 15% have World Wide Web pages. This growing use of computers and still small use of networks has created industry awareness of small businesses as markets for network hardware and software, as well as computer training. Information technology leaders such as IBM's Louis Gerstner, Microsoft's Bill Gates, and Novell's Bob Frankenberg all were early supporters of networkcentric computing, but their attentions were directed toward large, corporate organizations (Babcock, 1995). Big technology companies are now scrambling to provide network hardware and software solutions for small business ("Small business now a key demographic target," 1996).

Numerous studies have documented increased general use of computers, the need for computer education and training, and the value of classroom learning in computer education. Research results indicate that people progressing most rapidly in careers are those who know how to use computers to perform their jobs more efficiently, present ideas cogently, and work well in teams. By contrast, those newly unemployed and those who do not receive pay raises are often the people who do not have such skills (see, for example, Labich, 1993; Lord, 1992, 1995; Wiener, 1992).

Buckler (1996) reported increased use of computers by Canadian workers—43% of all workers. Among Canadian firms, the growing use of information technology has created greater pay differences between workers with computer skills and those without such skills. Research conducted by Canadian Policy Research Networks (Buckler, 1997) concluded that the jobs created by technology outnumber those lost because of technology and that new jobs tend to require more computer-related skills. Research by the National Association of Colleges and Employers (Buckler, 1996) reported that students with computer and technical skills fared best, among all graduates, in the job search process.

Business training program topics also indicate employer interest in computer skills. Statistics regarding the type of training most often provided for all employees indicate that computer skills training takes 93% of all the training programs (Training, 1995). While a variety of delivery methods are used for such training, Gordon, Hequet, and Jossi (1997) predicted that classroom-based, instructor-led training will continue to provide significant portions of employee computer training.

Gates (1995) emphasized that in a changing world, education is the best preparation for being able to adapt; as the economy shifts, people who are appropriately educated will tend to do best. Gates' advice is "to get a good formal education and then keep on learning" (p. 254). To provide such an education for those who will work in the growing small-business segment of the economy, educators need to determine the computer hardware and software skills needed by students now and by the year 2000. Because of rapid technology changes, prediction of need beyond that point may be difficult.

Problem Statement

The problem addressed in this study was to determine what computer end-user skills are recommended by office systems educators and small business managers for business students now and by the year 2000. In order to solve this problem, the following research questions were addressed:

1. What computer end-user hardware skills do business students need now and by the year 2000?
2. What computer end-user software skills do business students need now and by the year 2000?
3. What computer end-user programming skills do business students need now and by the year 2000?
4. What end-user telecommunication and groupware skills do business students need now and by the year 2000?
5. What end-user discipline-specific information systems skills do business students need now and by the year 2000?
6. What recommended end-user skills are significantly different between office systems educators and small business managers?

Purpose of the Study

The primary purpose of this study was to provide research findings regarding the similarities and differences between educators' and managers' recommendations of computer end-user skills for business students. If significant differences exist between educators and managers, educators may need to evaluate their curricula and to make necessary adjustments, thereby ensuring that the curricula are relevant to the business world. The secondary purpose was to provide a basis for informing business students of the computer end-user skills needed in small businesses so that they can choose appropriate elective courses for their academic programs.

Procedures

To collect data, a survey was conducted using two groups: (a) the members of the Office Systems Research Association (OSRA) who are college office systems educators, and (b) the executives of the *Inc.* 500 corporations (*Inc.*, 1996). These two groups were selected because the OSRA educators are specialists in and responsible for teaching information technology and computer applications for business at many U.S. colleges and universities; the *Inc.* 500 companies, on the other hand, represent small businesses, which employ the majority of the U.S. private work force (U.S. Small Business Administration, 1996). Small businesses are defined as those independently owned and operated, not dominant in their fields of operations, and with fewer than 500 employees (Gaedeke & Tootelian, 1991).

To identify the names and addresses of these educators and executives, mailing lists were obtained from the OSRA National Office and the 1996 *Inc.* 500 List. To guarantee that the samples would be within 5% variation from the true population value, Jaeger's (1984) formula for determining sample size was used and resulted in a sample of 120 members from the 174 OSRA educators, and the other sample of 217 executives from the *Inc.* 500 companies.

A four-page, Likert-response questionnaire (Zhao, 1996) was adopted and updated to solicit recommendations regarding computer end-user skills for business students now and by the year 2000. The questionnaire contained five sections: (a) demographic profiles of the responding educators and managers, (b) computer hardware and software skills, (c) computer programming skills, (d) telecommunication and groupware skills, and (e) discipline-specific information systems skills.

Based on the review of related literature (see, for example, Arnett & Jones, 1993; Blanton & Schambach, 1992-1993; Lynch, Stewart & Teglovic, Jr., 1995; McCollum, 1996; Nickerson, 1993; Ohio State University Center on Education and Training for Employment, 1995), the basic computer skills selected for this survey involved the use of eight hardware components (keyboard, mainframe, microcomputer, minicomputer, modem, mouse, printer, scanner), ten operating systems (Windows 95, Windows NT, Windows 3.1, DOS, IBM OS/2, Macintosh, UNIX, VAX, VM/MVS, VMS), four word processing software packages (Ami Pro, Word, WordPerfect, Write), four spreadsheet software packages (Excel, Lotus 1-2-3, Quattro Pro, VP-Planner Plus), four database software packages (Access, dBase, FoxPro, Paradox), and three desktop publishing/presentation software packages (Harvard Graphics, PageMaker, PowerPoint).

The computer programming skills selected for this study were programming with BASIC, C/C++, COBOL, FORTRAN, Pascal, RPG, and programming within database, spreadsheet, and word processing software. The telecommunication skills included the Internet, intranet, local area networks (LAN), wide area networks (WAN) for using e-mail, World Wide Web, searching, downloading, uploading, and sending information. The groupware skills included the skills of using Lotus Notes, MS Exchange, and Novell GroupWise.

Discipline-specific information systems skills often used by specialized business professionals were identified as follows: (a) accounting: applications for accounts payable, accounts receivable, budgeting, fixed asset accounting, general ledger, payroll, and tax accounting; (b) finance: applications for cash management, credit analysis, and portfolio management; (c) marketing: applications for billing, direct mail, inventory control, order entry, sales analysis, and sales forecasting; (d) management: applications for decision support systems, expert systems, executive support systems, and human resource management systems; (e) manufacturing: applications for computer-aided design (CAD), computer-aided manufacturing (CAM), just-in-time (JIT) inventory management, and production scheduling; and (f) management information systems (MIS): software for systems analysis and design, systems implementation, and systems maintenance.

A systematic sampling procedure was used to identify the 120 OSRA educators and 217 *Inc.*500 executives included in the respective samples. A total of 337 questionnaires were mailed with a cover letter to each member of the samples in early December 1996. A follow-up letter was mailed with a backup questionnaire in late January 1997 to thank the respondents and to remind the nonrespondents to complete and return their questionnaires.

Of the 93 responses received from the OSRA educators, 88 were usable—a 73% response rate. From the *Inc.* managers, 125 responses were received and 63 of them were usable—a 29% response rate. The nonusable *Inc.* 500 responses were from post offices indicating that the companies had been relocated and their mail forwarding service was expired or from companies' mail offices indicating that the addressees had retired or left the companies.

Each usable questionnaire was edited and coded, and frequency counts, percentage distributions, and weighted averages were computed. In analyzing the data, the midpoints of each scale range (the real outer limits) were used in determining the degree of recommendation for that skill; that is, mean weighted responses of 4.5-5.0 = strongly recommend; 3.5-4.4 = recommend; 2.5-3.4 = no opinion. Crosstabulation analyses and Pearson Chi-Square tests were used to determine any significant differences of the recommendations between educators and managers.

Findings

The findings of this study are reported in the following order: (a) the demographic profiles of the

participating companies and colleges, (b) the respondents' recommendations for computer end-user skills, and (c) significant differences of the recommendations between educator and managers.

Profiles of the Responding Colleges and Companies

As shown in Table 1, 88 colleges and 63 *Inc.* 500 companies participated in this study. Of the 88 responding schools, 83% represented four-year colleges. By contrast, the 63 *Inc.* 500 companies represented a wide range of industries, with 30% in information and communication technology industries. (Table 1)

Table 1
Demographic Profiles of the Responding Colleges and Companies

	Frequency	%
Types of Colleges:		
Four-Year College	73	83.0
Two-Year College	10	11.4
Private Business School	3	3.4
Vocational School	2	2.3
Total	88	100.0
Types of Companies:		
Information/Communication Technology	19	30.2
Service (health care, staffing, ...)	12	19.1
Manufacturing/Processing Industries	11	17.5
Retail/Wholesale	9	14.3
Banking/Finance/Insurance	7	11.0
Construction/Engineering/Mining/Oil/Gas	5	7.9
Total	63	100.0

Recommended Computer End-User Skills

This section illustrates the computer end-user skills recommended for business students now and by the year 2000 by office systems educators and *Inc.* managers. The recommended skills include hardware and software, programming, telecommunications and groupware, and discipline-specific information systems skills. Significant differences between educators and managers are reported in their respective sections.

Hardware and software skills. Of the eight hardware skills, both educators and managers rated five (microcomputer, mouse, printer, keyboard, and modem) as being *strongly recommended* for business students now and by the year 2000. Conversely, both groups rated the skill of using mainframe computers as being *least recommended*. The only significant difference was that educators considered the skill of using a scanner as more important than managers did. (Table 2)

Concerning software skills, both educators and managers rated Windows 95 at the top of the list of 10 operating systems. While Windows 95 was rated as being *strongly recommended*, Windows NT, DOS, Windows 3.1, and UNIX were considered as *recommended* for business students now and by 2000.

Among the word processing software packages, both educators and managers evaluated MS Word highest as *strongly recommended* and WordPerfect the second as *recommended* now and by 2000. Similarly, MS Excel, Access, and PowerPoint were ranked by both groups as *strongly recommended*, whereas Lotus 1-2-3, dBase, PageMaker and Harvard Graphics were rated as *recommended* in their respective categories.

Programming skills. As shown in Table 3, except for programming with C or C++ language, skills in using the other five programming languages were rated as being less recommended by both educators and managers for business students except for MIS majors. However, regarding programming skills in spreadsheet, database, and word processing software applications, educators recommended that business students should possess these programming skills. By contrast, ma nagers made significantly stronger recommendations of the programming skills in spreadsheet and database applications for business students now and by the year 2000. (Table 3)

Telecommunication and groupware skills. All the 10 telecommunication skills were recommended by educators and managers for business students now and by the year 2000 (see Table 4). Among them, nine skills (using e-mail, Internet, World Wide Web, intranet, LAN, searching, downloading, sending, and uploading information) received strong recommendations, with e-mail in first place followed by the Internet. Regarding groupware applications, both educators and managers rated the skills of using Lotus Notes, GroupWise, and Exchange as *recommended*, although managers rated Exchange significantly higher than did educators. (Table 4)

Information systems skills. Office systems educators and *Inc.* 500 executives were asked to rate discipline-specific information systems skills for various business majors. As shown in Table 5, both educators and managers rated the skills in using 27 information systems in six disciplines (accounting, finance, marketing, management, manufacturing, and MIS) as being either *strongly recommended* or *recommended* for students of respective majors now and by the year 2000. Only six of the 27 recommended skills (fixed asset accounting, portfolio management, sales analysis, inventory control, billing, and order entry) showed significant differences between educators and managers. (Table 5)

Summary and Discussion

Both office systems educators and *Inc.* 500 executives recommended that business students possess computer end-user skills in each of the following nine categories: computer hardware, operating systems, word processing, spreadsheet, database,

Table 2
Hardware and Software Skills Recommended for Business Students Now and by the Year 2000

	Weighted Average[a] Educators (n=88)	Inc. 500 (n=64)
Hardware Skills:		
Microcomputer	5.0	4.8
Mouse	4.8	4.8
Printer	4.8	4.7
Keyboard	4.7	4.8
Modem	4.6	4.7
Scanner	4.6	4.2**
Minicomputer	3.4	3.8
Mainframe	3.2	3.3
Software Skills:		
Operating Systems		
Windows 95	4.6	4.8
Windows NT	4.3	4.5
DOS	3.7	3.8
Windows	3.6	4.1
UNIX	3.6	3.7
Macintosh	3.0	3.1
IBM OS/2	2.9	2.9
VMS	2.9	2.7
VAX	2.9	2.8
VM/MVS	2.8	2.7
Word Processing		
MS Word	4.6	4.7
WordPerfect	4.3	4.0
Ami Pro	3.0	2.9
Write	2.8	2.9
Spreadsheet		
Excel	4.6	4.8
Lotus 1-2-3	4.1	4.2
QuattroPro	3.3	3.5
VP-Planner+	2.9	3.0
Database		
MS Access	4.6	4.6
dBase	3.6	3.7
Paradox	3.4	3.3
FoxPro	3.2	3.6**
Desktop Publishing/Presentation		
PowerPoint	4.6	4.5
PageMaker	3.8	3.9
HarvGraphs	3.5	3.4

[a] Responses to Linkert-type scale where 5 = strongly recommended and 1 = not at all recommended.
** Difference significant at p <.001

desktop publishing, programming in word processing, spreadsheet, and database, telecommunications and groupware, and discipline-specific information systems related to student major. Programming languages are less recommended for business students except for MIS majors. This finding is consistent with the computer-competency requirements for the 12 occupations within business and computer technology areas (Ohio State University Center on Education and Training for Employment, 1995).

Second, the following 10 computer end-user hardware and software skills were strongly recommended by both educators and managers for business students now and by the year 2000:

- Hardware: microcomputer, mouse, keyboard, printer, modem.
- Software: Windows 95, Word, Excel, Access, PowerPoint.

This finding indicates that Windows 95 and Microsoft Office suite have become more popular than DOS, WordPerfect, Lotus 1-2-3, dBASE, and Harvard Graphics, which once dominated most computer labs in business schools (Lynch, Stewart & Teglovic, Jr., 1995).

Third, both educators and managers recommended strongly that business students obtain the following nine telecommunication skills now and by the year 2000: e-mail, Internet, WWW, Intranet, and LAN for searching, downloading, sending, and uploading information. The findings indicate a growing importance of computer communication skills in business. These findings support Bob Frankenberg's, Bill Gates', and

Table 3
Programming Skills Recommended for Business Students Now and by the Year 2000

	Weighted Averages[a] Educators (n=88)	Inc. 500 (n=64)
Programming Languages:		
C or C++	3.9	4.1
BASIC	3.3	3.6
COBOL	3.2	3.1
Pascal	2.9	3.0
RPG	2.8	2.8
FORTRAN	2.7	2.8
Programming in:		
database	4.1	4.6**
spreadsheet	4.0	4.7**
word processing	3.8	4.2

[a] Responses to Linkert-type scale where 5 = strongly recommended and 1 = not at all recommended
** Difference significnt at p<.001

Table 4
Telecommunication and Groupware Skills Recommended for Business Students Now and by the Year 2000

	Weighted Averages[a] Educators (n=88)	Inc. 500 (n=64)
Telecommunications::		
E-mail	5.0	4.9
Internet	4.9	4.9
WWW	4.9	4.7
Search inf.	4.8	4.8
Download inf.	4.7	4.7
Send inf.	4.7	4.7
Upload inf.	4.7	4.6
Intranet	4.6	4.6
LAN	4.5	4.6
WAN	4.2	4.3
Groupware:	4.1	3.8
Lotus Notes	3.7	3.8
Novell Group Wise	3.6	4.2**
MS Exchange		

[a] Responses to Linkert-type scale where 5 = strongly recommended and 1 = not at all recommended
** Difference significant at p<.001

Louis Gerstner's notion that network-centric computing is the wave of the future (Babcock, 1995; Gates, 1995).

Moreover, both educators and managers recommended the skills in using 27 information systems in six disciplines (accounting, finance, marketing, management, manufacturing, and MIS) for students of respective majors now and by 2000. A number of executives added that many small businesses are still working on storing all information on computers. Therefore, having computer skills in the respective areas can help business graduates become heroes in their companies when they are able to propose cost-cutting and time-saving ways to track business information.

Finally, few significant differences were found between educators' and managers' recommendations for business students. This finding indicates that educators are providing business students with the education that is needed in small businesses across industries. The finding also reveals that educators respond actively to the growing demand for new employees with sufficient computer skills (Small Business Reports, 1992).

Conclusions and Recommendations

Based on the findings of this study, the following conclusions are drawn:

1. Office systems educators and small business executives share similar recommendations of the computer skills needed by business students now and by the year 2000.

2. The following 21 computer hardware, software, programming, and telecommunication skills appear to be critical components of a computer education program for business students now and by the year 2000:

- Hardware: microcomputer, keyboard mouse, printer, modem.

Table 5
Information Systems Skills Recommended for the Related Business Students Now and by the Year 2000

	Weighted Average[a] Educators (n=88)	Inc. 500 (n=64)
In accounting:		
Budgeting	4.5	4.6
General Ledger	4.3	4.6
Accounts receivable	4.3	4.5
Accounts payable	4.3	4.5
Payroll	4.2	4.3
Tax accounting	4.2	4.2
Fixed asset accounting	4.1	4.4*
In finance:		
Portfolio management	4.4	4.0*
Cash management	4.3	4.6
Credit analysis	4.2	4.4
In marketing:		
Sales forecasting	4.3	4.5
Sales analysis	4.2	4.6**
Inventory control	4.1	4.4*
Billing	4.0	4.3*
Direct mail	4.0	4.1
Order entry	3.9	4.2*
In management:		
Decision support sys.	4.4	4.4
Human resource mgt.	4.4	4.2
Executive support sys.	4.2	4.2
Expert systems	4.1	4.0
In manufacturing:		
Production scheduling	4.2	4.4
Computer-aided design	4.2	4.2
JIT inventory mgt.	4.1	4.2
Computer-aided manufa.	4.1	4.2
In management information systems:		
Systems implementation	4.5	4.5
Systems analysis/design	4.5	4.4
Systems analysis	4.3	4.2

[a] Responses to Linkert-type scale where 5 = strongy recommended and 1 = not at all recommended
* Difference significant at p <.01
** Difference significant at p <.001

- Software: Windows 95, Word, Excel, Access, PowerPoint.
- Programming in: database and spreadsheet.
- Telecommunications: e-mail, Internet, WWW, Intranet, and LAN for searching, downloading, uploading and sending information.

3. Business students need to have expertise in at least one application software of each type related to their major; then, they will be able to easily learn other similar applications on the job.

Based on the conclusions, the following recommendations are made for managers, business school administrators, educators, and students:

1. Managers should consider active cooperation with business schools and educators on computer training programs. By doing so, companies can find business graduates with competent computer skills, thereby reducing the high cost of in-house training.

2. School administrators should ensure that business school computer labs are installed with a sufficient number of personal computers operating in the Windows 95 environment. These PCs should be running the current versions of applications software that are widely used in business. And the PCs should be connected to the Internet.

3. Business professors in specific disciplines should consider requiring students to do their course assignments using related computer applications software that are popular in their respective professions.

4. Business students should be encouraged to take more computer applications courses as electives to better equip themselves for the future.

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