A SURVEY OF MICROCOMPUTER SELECTION AND
USE IN BUSINESS SCHOOLS

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Introduction

　　There has been a revolutionary increase in the use of desk top computers over the last several years. In 1980, the number of desk top computers increased by approximately 53,000 each month. By the 1990's that number could reach 13 million (Business Week, September, 1984). Accompanying this increase in hardware sales is an increase in software availability for such computers. Micro software sales totaled $936 million in 1983 (Sigel, 1983). The selection of microcomputers and requisite software is becoming more difficult for management because of the increasing number of manufacturers and models.

　　Keen and Woodman (1984) emphasize the importance of using a proper approach in acquiring microcomputers. They indicate that the worst approach is to buy them one by one without an overall plan as to their use. Not only will the costs get out of control, but also the machines may not be able to work together. For example, a $3,000 investment in a stand-alone microcomputer represents a small risk, one which in many cases can be paid back in well under a year. A problem arises, however, when an organization plans to invest in 100 or more machines. Consider the hidden costs. If software, extra disk storage, printers, modems for communications, maintenance, and other costs are added, the initial cost of $3,000 per machine may skyrocket to $10,000. If the machines are incompatible with the main computing communications equipment, much of that investment is lost. Compatibility with available software is also essential, if money is not to be wasted. It is important, therefore, to consider these and other factors when selecting machines which match the needs of the organization. Making the right computer choices can be especially critical for business schools, which generally need to purchase equipment in volume for students and faculty and

clerical use. Budget constraints demand the equipment be chosen quite carefully so that costly mistakes can be avoided. This paper presents the results of a survey of academic schools of business that shows how over sixty schools made their decision.

Today's computers, many of which rely on a chip smaller than a postage stamp, are descendants of machines that filled a room and required miles of wiring to do their job (Salerno, 1981). Moreover, the technology is constantly changing. A recent article in Business Week (June 10, 1985) describes the new area of "superchips," wafers containing hundreds of chips that will each hold 4 million transistors. With the development of superchips and computer graphics technology, managers can scan a single picture rather than read through reams of printouts (TaKeuchi and Schmidt, 1980). Computer graphics can be very useful in planning and control, marketing applications, competitive analysis, product planning and retail productive analysis.

The Importance of Selecting Microcomputers for Business Schools

Business schools across the nation are attempting to integrate computers into their curricula, shifting from mainframe and minicomputers to microcomputers (Pica, 1985; Smith and Trent, 1985). Many more topics are now being taught in schools of business with the assistance of microcomputers and integrated software (Coppage, 1985), mirroring the shift in the business world to increased reliance on computers for management and control (Kaplan, 1983).

Business schools teach model building and the use of computer-based models in Decision Support Systems (DSS). For example, many schools use computer-based models in discussing topics such as determining manufacturing needs, inventory levels, investment alternatives, and joint ventures. Computer-based models are important in achieving many managerial tasks such as

financial forecasting, production planning, man power collections, and market projections (Kaplan, 1983). It is clear that there is a need to integrate and use the computer technology by business schools. However, it is important to choose the most appropriate hardware or software for business schools, too.

It is just as crucial for business schools as for businesses to select the appropriate hardware and software. While businesses and business schools differ in decision making processes and the uses to which computers are put, they face similar situations in regards to computer <u>acquisition</u> and support.

The selection of hardware and software is equally important for both businesses and academic institutions. Obviously, the test hardware is only as good as the software that accompanies it.

In addition, business schools or businesses that use diversified computer facilities are not as efficient as those using integrated systems. For all of those reasons, careful study and assessment of organizational need should precede selection of computer hardware and software.

<u>Literature Review</u>

The literature on computer selection and use include no formally documented surveys of business schools. However, the growing literature on software selection includes information about the evaluation and selection of software for Decision Support Systems. The most relevant literature in this area is on the selection of statistical and forecasting packages, accounting packages, financial packages, and general factors for evaluating DSS (Francis and Heiberger, 1975; Muller, 1980; Levitan, 1981; Mahmoud, 1983; and Keen and Woodman, 1984). In the area of small business, Mahmoud and Malhotra (1986) and Karasik (1984) among others, have discussed some principles that small businesses should consider in selecting their computers. Sanders, Reed, and

Munter (1982) noted some of the major costs to be considered when buying

packaged software for micros and minis. While Mahmoud and Malhotra (1986)

discussed appropriate procedures that small businesses would follow in

selecting their hardware and software, information provided related to the

selection process in business schools is very limited. Frand and McLean

(1985) have completed two surveys about the computer technology at business

schools for a selected number of business schools. The present study

investigates the process used by business schools in selecting their hardware

and software as a first step toward developing guidelines and prescriptions

for computer selection and use.

Methodology

Data were collected by sending out a questionnaire to business schools in

the U.S. which have Master of Business Administration (MBA) programs and which

have been accredited at both graduate and undergraduate levels by The American

Assembly of Collegiate Schools of Business (AACSB). The purpose of the

questionnaire was to investigate microcomputer selection in business schools

that currently use microcomputers and those planning to use them. The

questionnaire was also used to identify the level and type of microcomputer

usage by the various departments and to identify the types of equipment and

software used. Usable questionnaires were received from 62 business schools

that were using or planning to use microcomputers. The response rate was 41.3

percent.

The list used to generate the sample was Lovejoy's Guide to Business

Schools (1983). A sample of 150 schools was drawn from the above list by

selecting every other school. Data were coded and statistically

analyzed by using SAS (SAS Institute Inc., 1980) and Lotus 1-2-3 packages.
The results were analyzed using frequency analysis and cross-tabulations.

Needs Considered in Microcomputer Purchase Decisions

Table 1 summarizes the responses to a question about whose needs most
influenced the decision to purchase microcomputers. It can be seen that the
majority of the schools considered the student needs as the most important
influence on microcomputer selection.

Insert Table 1 about here

It is important to note that even with the increased emphasis on faculty
research, most of the respondents (81 percent) indicated that students were
their main concern in selecting microcomputers. The needs of faculty and
researchers were cited as most important by only 17 percent of the
respondents, while administration, with one response, accounted for two
percent. The Frand and McLean survey (1985), which dealt with factors which
led business schools to expand on their present micro systems, revealed that
faculty ranked first and students ranked second. Otherwise, rankings are
similar to those of the present survey.

Procedures Used in the Search Stage of Decision Making

Information is a key element in the selection of microcomputers due to
the dynamic technological changes occurring in the computer industry. Table 2
outlines the specific procedure used by business schools in collecting
information in the search stage of the decision making process.

Insert Table 2 about here

A variety of sources were used by 80 percent of those who did gather information in the search stage. Note the almost 20 percent of the business schools in the sample did not request any information prior to acquiring microcomputers. This suggests that a significant minority of schools do not use a systematic approach when selecting their systems. It has been reported that between one-third and one-half of the computer systems installed are not properly selected (Vaid-Raizada, 1983). One way to avoid this problem is to develop a formal selection procedure in choosing a microcomputer system.

It is important that business schools apply such a systematic procedure when considering microcomputers for their curricula. Furthermore, before being influenced by attractive offers from some vendors, schools should analyze these offers carefully.

Search and Collecting Microcomputer Information

Table 3 shows the number of computer firms that business schools contacted before purchasing their microcomputers. Over 70 percent of the respondents contacted more than three different vendors before they bought their microcomputers. The number of firms contacted may reflect care in selection and/or the increasing number of computer manufacturers.

Insert Table 3 about here

Almost 14 percent contacted two firms, while only nine schools (15 percent) contacted only one firm. These results, coupled with responses to the question on time spent in the decision process, indicate that most colleges and universities take microcomputer selection seriously.

With respect to the decision making process, it is important to collect information on both systems currently in use and potentially new compatible systems. This will enable business schools to identify the pros and cons of a diverse set of micro systems. Furthermore, monitoring the change of information and new technology would enable business schools to test and select the appropriate micros.

Time Spent on the Decision Making Process

Developing search procedures for micro systems and contacting the appropriate firms takes up a considerable amount of time. Table 4 shows how much time respondents spend on the entire decision making process.

Insert Table 4 about here

Only four respondents (6.7 percent) indicated that they spent less than one month on the decision making process. Thirty-five percent indicated that they spent one to three months and 23 percent indicated they spent three to six months. Another 35 percent indicated that they spent more than six months.

The fact that 58 percent of the respondents spent one to six months in the decision making process may reflect the importance attached to computer selection. For business, Petre (1983) found that the computer selection process normally takes between one and four months. In this sample of business schools, the average was six months. It is not clear whether the longer time period ensures more satisfactory results.

Number of Present Systems at Business Schools

The number of microcomputer systems that are presently being used at the sample schools is shown in Table 5. In addition, the number of IBM systems is compared with the number of non-IBM systems currently being used.

Insert Table 5 about here

The results indicate that most schools have either one or three or more computer systems in operation (97 percent of total sample). Only two schools reported having two systems (3 percent of the total). Of the 30 schools that have only one system, 16 schools (53 percent) have IBM systems and 14 (47 percent) have some other brand. However, for those schools having three or more systems, all have IBM systems (48 percent of the total sample). The two schools which reported having two systems also had IBM. In summary, of the 62 schools that have microcomputer systems, all but 14 (22.6 percent) have IBM systems. The non IBM users are those with only one system.

Criteria for Selecting Microcomputers

To determine the criteria that are used in the selection of microcomputers, a list of different criteria was presented in the questionnaire along with space for respondents to add others. The respondents were asked to rate the most important selection criteria on a scale of one to five, with five being most important and one being least important. These criteria were developed through exploratory research. This phase involved a review of the academic and trade literature, interviews with microcomputer representatives, and a pretest sample. The relative importance of factors involved is given in Table 6. End users, type of software, reputation of manufacturer, and support services were the most important criteria. These

were not, however, the only criteria schools of business considered in their

selection process (see Table 6).

Insert Table 6 about here

Selection criteria are usually developed by the people involved in the

selection process. Table 6 shows that end users, 4.61, was highest ranked and

type of software available, 4.51, rated second on the list. Reputation of

manufacturers at 4.00 and vendor support at 3.86, also rated high on the list.

Memory capacity as well as grants and discounts were rated the same with an

average score of 3.72. It should be noted that ergonomics and previous

experience were on the bottom of the list of criteria considered in selecting

micros. This result differs from another study by Mahmoud and Malhotra (1986)

which revealed that vendor support ranked first in selecting their

microcomputers.

The high ranking of both end users and type of software available

reflects the business school's emphasis on applications of the microcomputer,

while the relatively strong emphasis on reputation of manufacturer and vendor

support reflects a concern for performance, perhaps to avoid costly computer

down-time. This may be attributed to the greater potential for in-house

support personnel being available in colleges of business as compared to small

businesses.

People Involved in Determining the Criteria for Selection

Table 7 shows the key people who are involved in determining the

selection criteria used in choosing microcomputers for business schools.

Insert Table 7 about here

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Over 60 percent of the sample indicated that a committee had developed

the selection criteria for microcomputers. Selection decisions by Deans (17

percent), primary use department (10 percent), faculty member (9 percent), and

the computer center (7 percent) were the other indicated methods.

The overwhelming emphasis on the committee may be reflective of the

essential multidisciplinary approach used in most business colleges.

Therefore, the results support the need for a multidisciplinary approach in

the identification of criteria used in the selection of microcomputers.

Microcomputer Usage

The primary users of microcomputers within the schools of business are

listed by frequency of use and mean score. Departmental use was measured

using a five point rating scale with five representing heavy use and one

representing light use (see Table 8).

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Insert Table 8 about here

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While Management Systems department had the highest mean use score

(4.05), with Management Sciences department second (3.22), the largest number

of schools responding (58) chose Accounting department with a mean score of

3.55 followed by Finance department with the second largest number of schools

reporting (55). Over 55 percent of the schools indicated that Economics

department, Marketing department, and Management department were also using

microcomputer systems. Industrial Relations department with fewer than 50

percent of the schools responding had the lowest usage rating (2.0).

Given the availability of software and the quantitative nature of the

disciplines, it is not surprising that Accounting and Finance departments seem to be the most broadly represented areas. For the same reasons it is not surprising that Management Systems department and Management Science department are rated highest in usage.

Number and Type of Microcomputers

Table 9 deals with various brands of microcomputers now used and/or expected to be purchased by the surveyed business schools. The table also shows the number and type of terminals in use and to be bought.

Insert Table 9 about here

Over 54 percent of the microcomputers in use were IBM's. Nearly 89 percent of those were IBM PC's. Apple computers were a distant second (10 percent) followed by Digital, Zenith, Tandy and Hewlett Packard. Compaq is in use by three schools but with seven terminals. The remaining microcomputers were in use by two or less schools.

The "planned-to-be-purchased" category is also dominated by IBM. Of the 490 planned for units, IBM accounted for 91.2 percent. The next largest group was Zenith 150s with 4 percent. This last question, however, was left unanswered by many respondents and the results must be interpreted in the context of IBM's dominance of the microcomputer field reflected in the recent explosion of IBM compatible micro systems and supporting peripherals (Business Week, 1985). It is clear that IBM is the predominant choice of business schools. This corresponds to the results of the survey by Frand and McLean in 1985, who found that 85 percent of the schools surveyed had the same type of IBM-PC. Moreover, IBM's dominance, likely to continue, as IBM is viewed as

the favored manufacturer by those who do not have micros but plan to purchase them.

Software Usage

Table 10 lists the software currently in use or planned for acquisition by business schools. The most popular statistical software package is

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Insert Table 10 about here

Visicalc, used by over 20 percent of the respondents. With respect to possible future use, Minitab was considered most frequently. Wordstar was the most commonly used word processing program, in use by 43 percent of the respondents. Among those considering a word processing package for the future, Volkswriter was the top choice. In the area of database management, Database II, was most popular (43 percent) with Database III considered the most for future use. For integrated activities, Lotus 1-2-3 topped the list for both currently and planned use (70 percent and 7 percent respectively). The rapid change occurring in the software market tends to limit the conclusion that can be drawn from these data.

Conclusions

In selecting microcomputer systems, colleges of business must meet the needs of a number of different types of users, including students, faculty, researchers and administrators. This survey revealed that most schools of business place the greatest emphasis on the needs of students. Planners are faced with matching the ability of students upon entering the school and devleoping skills to be used upon graduation. While it would be helpful to match microcomputer systems to the skills of incoming students, it is more

important to teach skills that match the needs of future employees in the business community. Surveys, including this one, have shown that IBM computers dominate both in academic institutions and businesses, but it should also be noted that skills developed on one type of computer are usually generalizable to others. The heavy use of IBM systems probably indicates that IBM provides a good level of satisfaction to their customers, particularly when one considers that most plans for future acquisition specified IBM.

The results of this study of selection and usage of microcomputers in business schools reveals certain characteristics which suggest some broad preliminary guidelines for planners to follow when choosing computer systems and software:

1) Consider the needs of the primary users. The principal groups considered when developing selection criteria in this survey were students, along with faculty and researchers.

2) A committee representing the interests of all users, rather than a single individual or interest group should develop selection procedures and collect information. Most of the schools surveyed used such committees.

3) Multiple contacts to vendors should be made. Even if it is assumed that an IBM system will be purchased, for example, multiple contacts permit comparison of prices, support services, available software, and changes in technology. This is becoming more important with the huge increase in the number of IBM look-a-likes on the market.

4) Allow plenty of time for the search and decision-making process. The majority of schools surveyed spent from three to six months.

5)   Consider use patterns. The heaviest use of computers for teaching

purposes as revealed in this survey occurred in the quantitative disciplines--

Accounting, Finance, Management systems and Management Sciences.

Virtually all colleges of business are now using microcomputers for

teaching many courses, for conducting research, for administrative purposes,

and for word processing. This survey illustrates how these institutions have

gone about selecting their systems and shows the type of hardware and software

most likely to be considered. In addition, the survey shows that nearly all

academic departments use microcomputers to some degree, with the heaviest use

among the quantitative disciplines.

Further research is needed to determine satisfaction with present systems

and how systems are adapted to incorporate new technological developments and

advances in hardware and software.

TABLE 1
Rank of Personnel Most Considered in the
Decision of Purchasing the Micro

Personnel Considered	Frequency	Percent
1. Business Students	46	80.70
2. Faculty	7	12.28
3. Researchers	3	5.26
4. Administrators	1	1.76
	57	100.00

TABLE 2

Different Types of Procedures Used in Collecting
Information in the Search of Computers

Type	N	Percent
Request for Information	13	23.2
Request for Quote	11	19.6
Request for Proposal	9	16.1
Request for Information and Request for Quote	6	10.7
Request for Information and Request for Proposal	4	7.2
State Contract	2	3.6
None of the above were used	11	19.6
Total	56	100.0

TABLE 3

Number of Computer Firms Contacted
Before Purchasing the Micro

No. of Firms Contacted	No. of Respondents	Percent
One firm	9	15.52
Two firms	8	13.79
3 - 4	21	36.21
5 - 6	20	34.48
Total	58	100.00

TABLE 4

Time Spent on the Decision Making
Process for Micro Systems

Time	N	Percent
Less than 1 month	4	6.67
1 - 3 months	21	35.00
3 - 6 months	14	23.33
More than 6 months	21	35.00
Total	60	100.00

TABLE 5

Number of Systems Available at Business Schools
IBM vs. Non-IBM Distribution

Number of Systems	IBM Systems		Non-IBM Systems		Total	
	No.	%	No.	%	No.	%
1. One System	16	25.8	14	22.6	30	48.4
2. Two Systems	2	3.2	--	----	2	3.2
3. Three Systems or more	30	48.4	--	----	30	48.4
Total	48	77.4	14	22.6	62	100.0

TABLE 6

Summary of Criteria Used and Ranked
According to Their Mean Score of Importance

(N=62)

Rank	Criteria	No. of Mentioned	Mean Score
1.	End Users (faculty, students, staff)	57	4.61
2.	Type of Software Available	60	4.51
3.	Reputation of Manufacturers	50	4.00
4.	Vendor Support	43	3.86
5.	Memory Capacity	40	3.72
6.	Grants or Discounts	47	3.72
7.	Reputation of Vendor	37	3.67
8.	Availability to link with Mainframe	45	3.60
9.	Quality of Maintenance	42	3.59
10.	Upgrading Capability	42	3.59
11.	Processing Power	40	3.57
12.	Price	49	3.51
13.	User Friendliness	38	3.50
14.	Multi-user Capability	31	3.09
15.	Convenience of Physical Features (ergonomics)	27	2.81
16.	Previous Experience	30	2.50

TABLE 7

People Responsible for the Selection Criteria
Used in Choosing Microcomputers

(N=58)

		Frequency	Percent
1.	Committee	35	60.34
2.	Dean	10	17.24
3.	Primary Use Department	6	10.34
4.	Faculty Member	5	8.62
5.	Business School Computer Center	2	3.45

TABLE 8

Department Using Microcomputers the Most

(N=62)

Rank	Department	No. of Mention	Mean Score
1.	Management Systems	38	4.05
2.	Management Sciences	50	3.72
3.	Accounting	58	3.55
4.	Finance	55	3.07
5.	Economics	39	2.56
6.	Marketing	48	2.50
7.	Management	45	2.38
8.	Industrial Relations	21	2.00

TABLE 9

Number and Type of Microcomputers

Type of Micro	Currently Using			Planned To Be Purchased		
	Number of Respondents	Number of Terminals	% of Total	Number of Respondents	Number of Terminals	% of Total
IBM PC	42	1721	47.6	9	299	60.8
IBM XT	20	155	4.3	5	41	8.3
IBM RT	10	85	2.4	10	107	21.8
IBM Portable	1	2	*	1	1	*
MacIntosh	9	77	2.1	1	1	*
Apple II+	8	74	2.0	--	--	--
Apple IIe	8	119	3.3	--	--	--
Apple III	2	90	2.5	--	--	--
Digital Rainbow	6	203	5.6	--	--	--
Digital Pro	3	36	*	1	8	*
Lisa	2	7	*	1	1	*
Tandy TRS-80	5	52	1.4	--	--	--
HP 150	4	42	1.2	--	--	--
HP Portable	--	--	--	1	1	*
Zenith 100	4	147	4.0	--	--	--
Zenith 150	2	23	*	1	20	4.1
Compaq	3	7	*	1	1	*
Others	24	705	19.5	1	10	2.0
Total		3545	100.0		490	

* less than 1 percent

TABLE 10

Software in Use and Planning to Use

(N=54)

Software	In Use		Planning to Use	
	No. of Mention	Percent	No. of Mention	Percent
Statistical Packages				
Visicalc	11	20.4	—	0.0
Supercalc	5	9.3	1	1.9
Microstat	5	9.3	—	0.0
Minitab	—	0.0	3	5.6
SPSS/PC	—	0.0	2	3.7
Word Processing				
Wordstar	23	42.6	1	1.9
Wordperfect	6	11.1	—	0.0
Volkswriter	3	5.6	2	3.7
Multimate	2	3.7	—	0.0
PC Write	2	3.7	—	0.0
Database				
Database II	23	42.6	2	3.7
Database III	6	11.1	5	9.3
Multipurpose				
Lotus 1-2-3	38	70.4	4	7.4
Symphony	6	11.1	3	5.6
Multiplan	8	14.8	—	0.0
Others				
IFPS	4	7.4	2	3.7
Framework	3	5.6	—	0.0
Linds	2	3.7	—	0.0
Evergraphics	2	3.7	—	0.0
Knowledge	—	0.0	2	3.7

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