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ABSTRACT

The use of microcomputers by college administrators to increase productivity is discussed. Microcomputers can help increase productivity in the following administrative office tasks: decision support, communication, personal assistance, and task management. One of the most promising developments to emerge from the decision sciences over the past 10 years is Decision Support Systems. The three types of decision support aids for microcomputers that have proved to be of most value to both novice and expert microcomputer users are electronic worksheets, graph and chart formatting aids, and data base management systems. Two of the automated office subsystems that can improve communications are electronic mail systems and word-processing systems. Microcomputers can be used to implement both of these types of systems. Word-processing systems can help administrators reduce the time spent on editing and revising reports and correspondence. Software packages available to administrators include those for a daily personal calendar/reminder system, keeping notes by topical areas in the initial stage of writing a speech or report, and managing office tasks such as employees' schedules. A bibliography is appended. (SW)

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The Administrator's Use of Microcomputer Systems

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No recent technological development has captured the imagination of the public as completely as the personal microcomputer (PC). Farmers, students, businessmen—indeed, people in all walks of life—are purchasing microcomputers in ever increasing numbers and using them in a wide variety of applications from home entertainment games to sophisticated economic modeling. Apart from the sense of satisfaction gained from being able to own and operate a computer, the demand for these machines has been increased by their relatively low price and ease of operation. A PC that will satisfy the needs of most users can be purchased for less than one-half the price of a new automobile and operated by those with no formal computer training.

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The success of the microcomputer industry is indicated by an increase in gross sales—from $65 million a year in 1977 to $600 million in 1980, almost a 10-fold increase over the period (Meserve 1981, p. 188). In 1981, the microcomputer industry sold 1.1 million units; with an estimated 55 percent of this total purchased for business purposes (Carroll 1982, p. 45). By the mid-to-late 1980s, it is estimated that annual unit sales of PCs to small businesses will range from a low of 100,000 to a high of 1 million and that first-time purchases by large businesses will range from a low of $400,000 to 4 million units. Replacement sales to all business are estimated to range from 2.5 million to 4 million units annually (Nilles 1980). Combining these estimates results in predicted sales of personal computers between 3 and 9 million units per year by late 1980s.

What do businesses hope to gain by acquiring microcomputers in these numbers? The answer seems to be increased productivity from management and their staffs.

While most of the evidence regarding increases in managers' productivity is anecdotal and no quantitative data to support such claims are offered, the belief that microcomputers can increase managers' productivity seems to be widely held (Hackathorn and Keen 1981, p. 22; Stein 1982, p. 33; Ridge 1980, p. 2). Procter and Gamble, for instance, has 400 PCs scattered among its managers for that purpose, and other firms are following suit for the same reason (Carroll 1982, p. 46; Batt 1982, p. 4). The fact that businesses are acquiring more PCs for managers use, after initial trials, seems to support the belief that PCs increase productivity.

A study of PCs' use in one of its program offices conducted by the National Science Foundation (NSF) indicates some increases in productivity through computerized augmentation of staff activities (Bamford 1979). The types of activities for which computer augmentation proved to be most helpful are similar to those that can be implemented on a microcomputer—scheduling and monitoring key events, drafting and editing texts and tables for output in finished form, indexing and retrieving documents, exchanging messages, and filing key items in the machine for later use. The reported increase in productivity for the four NSF program officers studied was 22 percent while productivity for the secretary of the group increased 33 percent (Bamford 1979, pp. 139–40). While the study does suffer from some difficulties of sampling and procedure the results do indicate the magnitude of increased productivity made possible by computer augmentation of activities normally performed by many managers and staffs.

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Microcomputers are being used in a wide variety of applications in institutions of higher education. The Northwestern School of Law at Lewis and Clark College in Portland, Oregon, is using a microcomputer to increase the efficiency and effectiveness of recruiting students. Eventual plans are to keep track of students from initial application through graduation, career, and alumni activities ("Tracking Students . . . " 1981; p. 48). A micro-

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computer at the University of Virginia law school helps in fund raising activities by keeping track of donors' contributions and targeting specific populations for development activities ("In-house . . ." 1982, p. 77). Similarly, Yale University's School of Organization and Management uses a microcomputer to create targeted mailing lists (Even Tov 1981, p. 21). While these applications are interesting and certainly contribute to the overall effectiveness of the institution, they do not illustrate the power of microcomputers to increase individuals' productivity. It is in the area of increased productivity for administrators that microcomputers show the most promise.

Administrative office tasks can be separated into four function areas: (1) decision support, (2) communication, (3) personal assistance, and (4) task management. Microcomputers can significantly contribute to increasing administrators' productivity in each of these areas.

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DECISION SUPPORT

One of the most promising developments to emerge from the decision sciences over the past 10 years is Decision Support Systems (DSSs) (Alter 1980; Keen and Scott-Morton 1978; Sheehan 1982), which describe the decision making of an individual administrator (Hackathorn and Keen 1981, p. 22) and then construct a computer-based system of data and analytical tools that will support unstructured decision making (Sprague and Watson 1979, p. 61). Ideally, these systems must be designed so that an administrator can apply the analytical tools to the data using a terminal and commands that are simple to use and easy to learn yet powerful enough to produce results that will aid decision making. In DSS theory, the system technology is constructed by a DSS builder after a careful analysis of the administrator's decision making. With the introduction of microcomputers, however, the administrator can construct his or her own microcomputer-based DSS and can "directly use the technology for Decision Support in a natural way, not dependent on another's notions of the decision-making process" (Hackathorn and Keen 1981, p. 22).

Over the past several years, a wide variety of decision support aids have been developed for microcomputers. The three types that have proved to be of most value to both novice and expert microcomputer users are electronic worksheets, graph and chart formating aids, and data base management systems.

Electronic worksheets are probably the most versatile decision support tools currently available for microcomputers. Two of the most widely used systems are Supercalc and VisiCalc, one or the other of which is available for virtually every microcomputer (Pogrow 1982, p. 57). VisiCalc is so versatile and useable that it is the first software system said to have been responsible for the sale of entire microcomputer systems (Ramsdell 1980, p. 192). Their most promising administrative uses are in modeling and budget construction, analysis, and updating (Pogrow 1982, p. 57; Ramsdell 1980, p. 191; Brown and Droege-mueller 1982, pp. 6-17; Litaker 1981; Sachs 1982). Economist David Cherub has estimated that 90 percent of all companies can do 90 percent of their business simulations on a microcomputer, indicating some of the versatility of these machines (McLamb 1981, p. 32).

A typical VisiCalc worksheet consists of a rectangular array of cells, which can be as large as 63 columns by 254 rows. Each cell can contain a number or an alphabetic label. Typically only the first cell in each column or row contains a label, and the rest contain numeric data. The power of these systems derives from the ability to associate a formula with a cell, which functionally relates that cell to other cells in the array. For example, in a budget application, one cell could be designated to generate the sum of all preceding cells in that row or column, while in a modeling application, a cell could be designated to hold the product, quotient, or some other arithmetic combination of cells in the arrray. When a numeric entry is changed in one of the cells, the values of all related cells are automatically updated to reflect the change. This feature allows an administrator to check several schemes for budget allocations or to change values or parameters in a model and immediately know the effect of these changes on the overall budget or model. While the results of using these systems to model various aspects of an institution's operation may prove useful, "the real value of a model comes not from just *using* it but from *creating* it" (Hayes and Nolan 1974, p. 110). These microcomputer-based systems allow the administrator to be in full control of creating the model.

Another important aspect of decision support is graphic aids. Data in tabular form make it difficult to identify many important associations between and among variables. But, when these variables are displayed visually, it is much easier to spot relationships, especially when several variables can be plotted on the same graph or chart.

The three types (of microcomputers) that have proved to be of most value to both novice and expert microcomputer users are electronic worksheets, graph and chart formating aids, and data base management systems.

A wide variety of graphic software is available for microcomputers (Good 1982a, p. 70). Line graphs, histograms, and pie charts can be constructed using these programs, and in some cases data can be transferred from an electronic worksheet to a plotting routine and displayed visually. An example of this type of software is the VisiTrend/VisiPlot package designed to be used with the VisiCalc electronic worksheet. This system is especially useful in time series applications because it allows for smoothing the data and creating linear regression functions for predicting future values (Ahl 1981). Once they have been set up and used in decision making, these graphic aids can be printed out in hard copy and incorporated into reports or presentations (Good 1982a, p. 72).

Data base management systems, (DBMSs) are another promising decision support tool available for

microcomputers. They are essentially electronic filing systems that can be used to produce reports from the records kept on the file. A file containing data on faculty members could be used to identify those faculty over a given age or those making over a specified salary or those having certain research skills (Wolfe 1981, p. 134). A file containing data on scheduled maintenance for buildings on campus could be

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used to estimate manpower requirements for maintenance over a period of years. A file containing data on the number of degree recipients per year in an academic program over a given period could be used to identify programs for possible termination (Brown and Droegemueller 1982, pp. 24-29). Because such files are usually kept for other purposes, their use for decision support will simply be added justification for maintaining them on a microcomputer. Barley and Driscoll (1981) give a comprehensive analysis of many of the microcomputer DBMSs currently available.

COMMUNICATIONS

Most administrators would agree that a large portion of their time is devoted to communicating in one form or another. A study of business managerial productivity by Booz, Allen, and Hamilton shows that 46 percent of top managers' time is spent communicating in meetings or over the phone and that a portion of the remaining 54 percent is spent creating or reading documents and seeking information ("Computer to [illegible]" 1981, p. 76). If administrators in higher education spend similar portions of their time on these activities, any technology that can reduce the time spent on them or make them more effective will promote increased administrative productivity (Mann 1982, p. 33). The technology for automation in the office, "perhaps the most explosive area of technological growth for colleges and universities" (Mann 1982, p. 25), seems to provide the means for improving administrators' communication in many institutions (Bennett 1981, p. 23). Two of the automated office subsystems most frequently mentioned are computer-based message systems, commonly called electronic mail systems, and word-processing systems (Staman 1981; Ridge 1980; Bennett 1981, pp. 23-24; Mann 1982). Microcomputers can be used to implement both of these types of systems (Underwood 1981; Mandell 1981; Boynton 1982).

Electronic mail systems are in use at a number of colleges and universities. For example, M.I.T., Stanford, Carnegie-Mellon, and the University of Wisconsin are using these systems to expedite communications among administrators and staff ("Mail, Mail . . . " 1982). They offer a number of advantages over traditional mail and message systems. Apart from the reduction of paper and expense for duplication, the major advantages of these systems are the reductions in time between sending and receiving a message and the elimination of missed telephone connections (Bennett 1981, pp. 22-23; Mann 1982, pp. 33-34).

Electronic mail systems usually require a central computer system to serve as a clearinghouse for messages sent through the mail system and as a resident base for message sent through the mail system and as a resident base for the various services provided by the mail system. In such systems, the microcomputer's role is simply to act as a terminal to provide access to the larger system; it can be adapted for use as a terminal by installing a circuit board in the microcomputer to facilitate the communications interface. The software of the larger system may have to be modified to accommodate the microcomputers (Boynton 1982, p. 23; Underwood 1981). Once the microcomputer has been adapted for use as a terminal, it can be used not only in the electronic mail system but also to gain access to all the other functions normaly available on the large system. For instance, if the college or university is a member of EDUNET or some other regional or national computer network and the network facilities are available through the central computer system, these facilities will also be available to the user of the microcomputer.

Microcomputers are capable of word processing in two distinct modes. The first is provided by the microcomputer acting as a terminal to a larger computer system having word-processing capabilities. Many electronic mail systems provide this type of capability for preparing and editing documents through the terminal with hard copy printed by the larger system (Bennett 1981, p. 24; Boynton 1982, p. 23). Microprocessors can also be used as stand-alone word-processing systems and, if equipped with a letter-quality printer, can produce high-quality documents. For an office without access to a dedicated word-processing system, this capability of microcomputer systems may provide the necessary justification for purchasing such a system.

While they are designed to increase the productivity of secretarial staff, administrators can use word-processing systems to reduce the time spent on editing and revising reports correspondence, and other documents. They can prepare documents in the usual way either dictated or hand written, after which the secretary enters them into the microcomputer word-processing system. The administrator, who only has to learn a few commands necessary to correct misspelled words and

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move sentences or paragraphs, then edits, formats, and revises the document into final form. The advantage of this process is that the usual type-revise-proof-retype cycle is avoided. For long reports requiring a number of revisions, the time saved by not having to carefully proofread the document several times may justify the administrator's time spent in revising the document.

While quite a few word-processing systems are available for microcomputers (Mandell 1981, pp. 89-90), the capabilities of these systems usually do not equal those of dedicated word-processing systems (Billadeau 1981). The microcomputer-based systems that do offfer a wide range of desirable features, such as Wordstar or Wordpro 4, may require

the purchase of one of the more expensive microcomputer systems (Pogrow 1982, p. 56).

PERSONAL ASSISTANCE AND TASK MANAGEMENT

Some of the more immediate administrative gains to be realized from the use of microcomputers are in the areas of personal assistance and management of office tasks. Available microcomputer software packages can help in both areas.

Several software packages are available to help administrators manage their time daily. One of these packages, Time Manager, which is available for TRS-80 and other microcomputers, provides a daily personal calendar reminder system

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that will list the administrator's appointments and other tasks to be accomplished that day. At the end of the day, those tasks completed can be checked off, and all remaining tasks will be automatically posted to the following day, thus ensuring that important tasks will not be neglected even though they were not completed as scheduled.

Another software program that can be used similarly is a computer-generated reminder system designed by E.M. Pass (1980). It can be used as an appointment scheduling system and as a "tickler" system. Messages can be put in the system and scheduled to be displayed when the system is activated on a given date or scheduled to appear on a recurring basis from a given start date. This latter feature can be especially helpful in scheduling the preparation of reports or other functions that must be completed regularly and periodically.

Microcomputer DBMSs can also be used in personal assistance functions for administrators. One such use is as an aid in the early stages of writing a speech or report (Brent 1981, p. 18). As ideas occur to the writer or relevant references are encountered, they can be categorized and stored in the system using a key word or phrase to identify the topic in the speech or report to which they apply. When it is time to prepare the document, these notes can be sorted by topic and printed out. If the administrator assembled the notes carefully, each could be a topic sentence in the draft, and the list could serve as a rough outline of the final document (Brown and Droegemueller 1982, p. 30).

Several available systems can be used to manage office tasks. They can be used to keep track of an individual employee's schedule or to keep track of several employees' schedules in a complex project. Their major objective is effective management of organizational time, although some can provide information about billing for employees time spent on various tasks or projects.

A program called Time Deadline Calendar/Scheduler is designed specifically to schedule tasks for individual employees. To use this program, an administrator must enter the series of tasks to be performed, an estimate of the time required to complete each task, the minimum daily time to be spent on a given task, and a priority rank for each task. Given this information for each individual, the program produces a schedule that ensures that each task is assigned enough time to be completed before the deadline and that high-priority tasks are completed first. Individuals with excessive work loads can be identified, and tasks can be reassigned more equitably among all employees (Suydam 1982, pp. 34-36).

Programs are also available that can aid the management of projects requiring the coordination of several people. One such program, Project Manager, a companion to Time Manager, can be used to produce PERT or Gantt charts for scheduling personnel for complex projects. It can graphically display a project in terms of time and sequence of tasks. If the time for one task is altered, the effect of the change on the total project is immediately apparent. It can also be used to pass information to the Time Manager program so that important project dates will appear as reminders on the Time Manager calendar.

A CONCLUDING CAVEAT

While microcomputers can be a valuable tool to help administrators solve a variety of problems, it is best to maintain a healthy skepticism regarding their immediate application. As Donald McIsaac has noted about developing technologies (1979, p. 11), society tends to overestimate the short-range impact of these technologies, while underestimating their long-range impact. Such may be the case with administrative use of microcomputers. The keys to the short-range impact of microcomputers on administrative functions are the reliability of these systems and the availability of software.

Very little information is available regarding the reliability of microcomputer systems. A study by the Minnesota Educational Computing Consortium regarding the feasibility of administrative use of microcomputers among school administrators and small business users found that "microcomputers had not been around long enough to adequately assess reliability" (Haugo 1981, p. 130). While loss of data was not determined to be a major problem, the study concluded that occasional problems of this nature could be expected and suggested that backup equipment and procedures could considerably reduce the risk of data loss (p. 130). General practice with microcomputer data kept on floppy disks is to make more than one copy of the data to guard against loss from a malfunctioning disk drive or other inadvertent loss of stored data.

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The availability of software for specific administrative uses in higher education can be a problem. Most of the software available for microcomputers is targeted for the mass market of personal or small business users of these systems. As a consequence, these programs are general purpose and may have to be tailored to meet specific administrative needs in higher education. On the positive side, however, these programs are relatively inexpensive, because of the large numbers sold, and can be used in a number of areas common to both business and education administration. Further, they are designed to be used by those with little or no background in computers, and some of the most widely available programs can be mastered by the nontechnician in no more than 3 days (Pogrow 1982, p. 59).

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