ACADEMIC MICROCOMPUTING

A Resource Guide

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Contents

CHAPTER

1

Introduction to Academic Microcomputing

Microcomputing epitomizes technological innovation in American academic life. Seemingly, each week's issue of the *Chronicle of Higher Education* bears news of yet another batch of university institutions committing their students to the purchase of this new technology. I recall recently discussing this matter with a professor of design who had just bought an advanced microcomputer for his son. "In the future," he told me, "there are going to be just two kinds of people—those who know and those who don't." This presumed "great technological divide" is a powerful motivator in the diffusion of microcomputer capacities.

Research shows that technological diffusion does not proceed simply by force of example. Rather, the influence of role models, reliance on networks established for other purposes, even faddism, play critical roles. Microcomputing is no exception. In this context, the educational administrator is deservedly wary.

FALLACIES ABOUT ACADEMIC MICROCOMPUTING

There are numerous fallacies and pitfalls encountered by those who would lead their institutions down this path. A few of the most important are the following.

Fallacy No. 1. Microcomputers are a mere fad. Microcomputers are not a mere fad because they perform certain generic functions common to virtually all aspects of academic

endeavor. These generic functions include word processing, data filing and retrieval, statistical calculation, and graphing. Moreover, in many situations, microcomputing can implement these tasks in a more efficient and convenient manner than the alternatives.

Ultimately, the fact that an investment of $2,000 in equipment may well substantially increase the productivity of a $25,000 manager is a compelling "bottom line" argument that the business community cannot ignore. A recent survey of 3,000 American managers in 1985 showed that two-thirds already utilized microcomputers, either directly or through support staff.[1] As the managerial microcomputer has spread in the private sector, academia is inevitably drawn to follow. Usually colleges follow the trend quite willingly, given their own needs of the same type, but even when there is resistance to technological change, the lure of microcomputing is powerful because of the need to train students for a technologically evolving "real world."

Counterfallacy No. 1. Microcomputers should be universal. The opposite fallacy seems to infect recent converts to the technology, who see microcomputing as a universal necessity. A little reflection shows that the generic functions of microcomputers are necessary if one is to compete effectively in business, academia, or elsewhere—but generic functions can be performed in ways other than microcomputing. Wealthier institutions may permit professionals to treat a mainframe computer as their "personal workstation," whereas poorer institutions may find inexpensive terminals hooked to computer-sharing networks to be the cost-effective way to go (as opposed to using microcomputers). Some will find older technologies quite adequate or pursue qualitative endeavors remote from the strengths microcomputers can deliver.

Diversity of needs will be great at any large and complex institution. The same survey cited above also reveals a slump in interest in computing in the business world as managers go beyond their honeymoon with end-user computing and come to perceive the limits of computers. In fact, W. L. Enslin has presented persuasive evidence that a moratorium on computer-

ization is a typical reaction against its initial rapid spread in American business.[2] Likewise in academia—even at institutions such as Dartmouth, which increased the number of personal computers on campus from 50 to 2,000 between 1984 and 1985—evaluation has found that "faculty and students feel generally positive about the effect of (computers) on the curriculum, but there is no evidence to date that the amount of learning has increased in courses using the computers."[3]

Fallacy No. 2. Programming is essential to computer literacy. Many colleges are now raising this banner, elevating programming to the level of a new undergraduate distribution requirement or allowing it to substitute for old ones such as mathematics or language. Learning programming to understand computing is akin to the traditional idea that Latin should be required for the individual who wishes truly to master English. A literate person does not necessarily know Latin but does know how to use the English language in the performance of the routine functions of work and life. Likewise, a computer-literate individual is not necessarily a programmer, but one who knows how to employ computers to accomplish routine tasks in his or her work and life.

Counterfallacy No. 2. Programming is not important. At first glance, it might seem that the development of commercial software will eventually fill every need of the professional, eliminating the need for programming. For many users this is a reality. Nonetheless, large numbers of others can attest that in any given area there will be commercial packages that do generally what one wants—but none that do specifically what one needs. It is impossible for software packages to provide all the options and choices needed by every type of user. Users may choose to adjust their work to fit existing software, but this cuts against the grain of professionalism. There are two other options: to have custom software written or to use generic programs with built-in customizing languages (e.g., the WPL language in Applewriter word processor, FRED in Framework integrated software, *Lotus 1-2-3* macro programs, or the dBASE database language). In every case in which managers go beyond word processing, the

manager is far better off if he or she understands the concept, design, and limits of computer programming.

Fallacy No. 3. Everything to do with computing must allow transportability and compatibility. Institutions that decide to encourage computing are often drawn to a view that calls for a totally integrated system. Everyone must have the same equipment—or at least compatible equipment—and it should be networked together. This viewpoint is an expensive one, so much so that some colleges despair at even trying. Although the technology to hook together all microcomputing facilities on a campus exists, it is not cheap. Moreover, the technology of communications and exchange is in rapid flux and investment requires great care. Often postponement is in order, particularly because, in fact, only certain clusters of computing facilities really need to exchange data electronically. I recently attended an expensive private-sector seminar on this topic. One of the leading suggestions: The safest and often quickest way to transport large amounts of disk-based data is still to put the disk in the mail.

Counterfallacy No. 2. Compatibility is not a problem. Our institution recently invested in a 20-station classroom of microcomputers made by a company our purchasing department insisted was technologically equivalent to IBM. When practice showed they weren't, and after the alternative company ceased operation, the lab had to be jettisoned at high cost. Compatibility is not always crucial, particularly for those who write their own software. In the generic areas (word processing, filing, statistics, and so on) the day is long past when faculty can be expected to decline commercial software in favor of home brew. For the large number reliant on commercial software, compatibility is very important. For this group there is a powerful attraction to "sticking with the leader": with IBM even if other machines are better, with *WordStar* even if other word processors are better, with dBASE III even if there are more powerful database managers, and so on. The attraction is that by staying with the leaders, the professional maximizes his or her options, support resources, transportability, and possibilities of professional ex-

change. Colleges that ignore this and try to lead technology rather than follow it do so at their own peril.

THE "SCHOLAR'S TOOLKIT"

Many more fallacies and counterfallacies could be cited, but the point has been illustrated that the matter of microcomputer technology does not lend itself to simple extremes. At this point, it would be nice to indicate the nature of the golden mean by which to navigate the future. There is, however, no single "correct" strategy that applies to all individuals or to all institutions. One starting point is a simple listing of a typical "scholar's toolkit." Although particular choices will vary, the description, below, of my own "toolkit" choices focuses on generic needs and leading products in wide use today. (Product sources are listed in Appendix A.)

For many scholars, microcomputing begins with word processing. We do much of our professional work in this way and no other aspect of microcomputing can increase our productivity so easily and quickly. I have chosen to use *WordStar* because it is a full-featured word processor, runs on a very large number of microcomputers, and has become a standard of the industry. By making the decision to go with the leading brand of word processor, I have accrued various bonuses: Third-party software (e.g., spelling programs, communications programs, database programs) frequently provides explicit interface with my word processor; secretaries, my own or colleagues', are far more likely to know and use it; and the commands it employs are often incorporated in other software I use, minimizing my need to learn new systems.

Spelling checkers are the next extension of word processing. Although I have owned them for some time, I have found them inconvenient up to now because one had to exit the word processor, use the spelling checker to mark mistakes, then reenter the word processor. The new generation of checkers, such as the *V-Spell*, allow correction without all these extra steps, and I now

find this function a convenient and natural add-on to my word processor. The newest version of *WordStar* supports *CorrectStar*, from the same company, and this allows in-place corrections and automatic reformatting, so I use this currently. There are also other word processor extensions: grammar checkers, bibliographic filers tailored to work with *WordStar*, Mailmerge (for form letters), the electronic thesaurus, even the electronic encyclopedia, and so on.

Database management is probably the function I use most. For example, I prefer to do my form letters through a database manager because the mailing database can then be used for all sorts of other searching, sorting, accounting, and statistical purposes, in addition to word processing of letters. I have chosen Ashton Tate's *dBASE III Plus* because, as the leader in the field, it gives me more technical support, users' groups, periodical coverage, and third-party add-ons than other databases. At its simplest level, it is easy to use, yet it has powerful features that approach some mainframe characteristics.

For example, one *dBASE III* application is running the National Collegiate Software Clearinghouse. *DBASE III* allows me to list our 100 products in automated catalogs (including extended memo-type descriptions), do accounting and process sales, print customer labels, and print form letters to customers who purchased a specific product (as for revisions), among other things. A second *BASE III* application keeps track of the review processes of the *Social Science Microcomputer Review*, adding new books, articles, and software for review; printing lists of available reviewers; checking time schedules; and sending form letters to the tardy.

Database managers are also useful for research. By keeping survey data in *dBASE III*, one may search, sort, and subset by case or variable, and perform simple statistical operations. Because *dBASE III* uses standard data formats, it is easy to move data to statistical packages and graphics packages or to other tools such as spreadsheets or word processors.

Spreadsheets are a specialized type of database manager, one in which all data are in memory simultaneously (so operation is

very fast but data size is limited) and are displayed as a rows-and-column ledger sheet. In this sheet, however, one may enter not only labels and numbers but also formulas—even complex formulas such as regression. Entry of additional data causes automatic recalculation of all formulas. In this way, the scholar can do sensitivity analysis showing the effects of incremental data shifts. Also, spreadsheets can be used to keep track of lab data, to compute course grades and averages, and to prepare budgets. *Lotus 1-2-3* is the leading business spreadsheet for the IBM and MS-DOS computers whereas *VisiCalc* and *SuperCalc 3* are leaders for Apple and CP/M machines.

In general, I recommend keeping one's data in a powerful database manager such as *dBASE III*. From there it may be transferred to other applications programs as needed. One such related program type is "integrated software packages" such as *Framework II*, an integrated package having word processing, spreadsheets, database management, graphics, outlining, and communications packages built in. *Framework*, like other integrated packages, is not as powerful in any of its elements as the best stand-alone product in each category (e.g., its word processor is inferior to *Wordstar*). However, it is an outstanding report writer. It enables one to integrate easily word processing, data from *dBASE III*, transfer data to spreadsheets, express data in graphs, and communicate a document to a publisher—all with a single command syntax and extremely user-friendly interface. (Had my work been primarily financial, I probably would have recommended *Lotus 1-2-3* and *Symphony* rather than *dBASE III* and *Framework*.)

One of the nice features of *Framework* as a report integrator is that I can use it to open a window on other functions. For example, I can open a window on a statistical package such as *A-Stat*. I happen to use *Statgraphics* because of its wide choice of statistical procedures and integrated three-dimensional graphics, but many others are available. (I purposely prefer a small, easy-to-use statistical package to an *SPSS-PC* precisely because the smaller packages can be operated as windows in larger packages, whereas an *SPSS-PC* takes over the entire machine and may be

more power than needed.) One can also use a communications package to download data and information from various electronic networks for use in conjunction with database and statistical packages.

Desktop utilities, such as *Sidekick*, are now becoming a popular part of a standard "scholar's toolkit." This program is coresident with whatever other program one may be doing, and one can access its functions at any time from within other programs (e.g., while I am doing word processing). The five functions are a calendar of appointments; a calculator; a notepad (allowing easy capture into a word processor file of anything going on on my screen); an automatic telephone dialer; and a chart of assistance in my programming work.

Beyond this, the scholar's "toolkit" gets into specialties such as simulations or automated control of research equipment. These in turn may require programming in a higher-level language such as BASIC or use of general-purpose simulation languages such as *GPSS* or *Micro-Dynamo*. To take another example, work on management may lead to use of specialized programs for cost-benefit analysis, project management, or policy analysis.

Overall, then, this is what the "professional toolkit" may well involve: word processing and spelling checking; database management, including programmable database applications; communications with mainframes and networks; integrated report writing, including outlining, spreadsheets, and graphics; statistics; and specialized applications in my field, including some limited need for programming tasks, which are not addressed by commercial products.

MICROCOMPUTING RESOURCES FOR EDUCATIONAL ADMINISTRATORS

There is an almost endless list of software resources that could be cited in addition to the general-purpose "toolkit" discussed above. Among those most relevant to academic microcomputing are resources designed for the special interests of college-level

educational administrators. Entire directories of suppliers of software for educational administration exist.[4] Resources range from educational management software to educational databanks to specialized educational equipment. The following is an alphabetical listing illustrating the range of microcomputer services and software useful for college administration.

Administrative Systems: A general menu-based system for admissions, financial aid, registration, and accounting is *EdDGE* from EMI System Solutions, P.O. Box 4226, Englewood, CO 80155; 303-799-4144; list $12,795 (IBM). A registration package oriented toward continuing education is *Registrar+* from K/M Data Systems, P.O. Box 10844, Greensboro, NC 27404; 919-299-8236; list $2,995 (IBM). More specialized programs exist for such areas as portfolio management (*PRO-VEST*, from Software Resources, Inc., 330 Congress St., Boston, MA 02210; 800-343-7745; list $5,500 [IBM]), student housing (*Shelter*, from Office of Technology Licensing, 105 Encina Hall, Stanford University, Stanford, CA 94305; 415-497-0651; list $425 [IBM]); and running conferences (*Conference Database System*, a *dBASE III*-related program, from NCSU Software, Box 8101 NCSU, Raleigh, NC 27695; 919-737-2468; list $23 [IBM]).

Competency-Based Instructional Planning is software to help teachers prepare competency-based course objectives as well as to track student performance through a test-score management system. Contact ETAA, Inc., 833 Meadow Wood Lane, Akron, OH 44321; 216-666-8628; list $295 (Apple).

Computer Data and Database Source Book (Avon Books, or on-line through NewsNet) and *Data Base Directory* (American Society for Information Science/Knowledge Industry Publications, White Plains, NY) both provide extensive coverage of downloadable data sources pertinent to education (and, of course, sections covering many other areas as well).

Computerized Calling allows a voice message to be telephoned to each person in a database and records voice responses to programmed questions. For example, students can be called with information concerning deadlines or events. An example of a product that does this is the Telecorp System 606 from Telecorp

Systems, 5825-A Peachtree Corners East, Norcross, GA 30092; 800-334-9907; list $3995, plus $274 for an optional printer.

Course Authoring Software enables teachers to create computer-based lessons, drills, and tests without the need to understand programming. Numerous products exist, including *Eazylearn*, Miracle Computing, 313 Clayton Ct., Lawrence, KS 66044; 913-843-5863; list $250 (IBM); *Infowriter*, Data Processing Resources Inc., P.O. Box 470944, Tulsa, OK 74147; 918-492-8873; list $99.00 (IBM); *Microtutor/Microscholar*, Locus Systems, P.O. Box 248, N. Wilkesboro, NC 28659; 919-838-4166; list $99.95 (Apple); *SuperSofcrates*, Simpac Educational Systems, 1105 N. Main St. Suite 11C, Gainesville, FL 32601; 904-376-2049; list $199 (Apple); *Teacher Turned Author!*, Raster Technology, 283 Hunters Point Trail, P.O. Box 3477, Longwood, FL 33579; 308-862-2859, list $999 (IBM); *Teaching Is Easy*, NCSU Software, P.O. Box 8101, Raleigh, NC 27695; 919-737-2468; list $22 (IBM); *The Author Plus*, Raptor Systems, 342 S. Main St. #1, Stillwater, MN 55082, 612-430-2980; list $495 (IBM); *Toricelli School, Editor, Scribe*, The Answer in Computers, 6035 University Ave. #7, San Diego, CA 92115; 619-287-0795; list $595 (IBM). Also available are authoring *languages*, more complex but more versatile than authoring systems. Examples include *PC/Pilot*, Washington Computer Services, 3028 Silvern Lane, Bellingham, WA 98226; 206-734-8248; list $100; and *Apple Pilot*, Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014; 408-996-1010; list $100.

DSS Demonstrator is available from the National Center for Higher Education Management Systems, P.O. Drawer P, Boulder, CO 80802; 303-497-0386; this product is used in conjunction with the spreadsheet *Lotus 1-2-3* to produce a variety of educational forecasting models (e.g., enrollment) for college administrators. It works easily and is quite powerful.

Executive News Service will allow educational administrators to accumulate on-line news clipping files to their research specifications. ENS is based on the AP state and national news wires and is available through CompuServe as a premium service costing $12.50 surcharge during nonprime hours or $15.00 during