

# Microcomputers in Faculty Development: The Florida FAC-NET Project

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This report summarizes the goals, design, and first two years of experience of a state-wide faculty development project that includes introducing and using microcomputers in eight participating family practice residency programs. Given the rapid growth of interest in the possible application of microcomputers in medical education, the lessons learned from this pioneering experience are summarized here in the hope that they will be of use to others.

## Goals and Features of the Project

The National Center for Faculty Development (NCFD) at the University of Miami School of Medicine is a recipient of a federal grant in faculty development in family medicine. As is true for many of the projects supported by this federal initiative, the major goal of this project is to help ensure that there will be a sufficient number of qualified teachers in the future for the field of family medicine. Most of the other projects have adopted the strategy of providing fellowship support to established family physicians so that they can spend up to a year in programs designed to prepare them for being teachers. As far as the authors can determine, this project is unique in giving major attention to current residents to help them develop and enhance their skills as teachers and their interests in pursuing a career involving full-time or part-time teaching.

Another distinguishing feature of this project is

its collaborative nature. The project involves all eight family practice residency training programs in Florida. The staff of NCFD coordinates and serves as a resource to this state-wide consortium.

Finally, this project is unique in its active use of the microcomputer, serving (1) as a means to an end, a tool to accomplish some of the goals of the project, and (2) as an end in itself by contributing to the participants' learning about computers in preparation for using them in their work as teachers and practicing physicians.

## The Microcomputer

### *As a Means to an End*

As originally conceived, the strategies of the Florida project included annual teacher development workshops conducted by NCFD staff at each of the eight sites, consultations by telephone and mail between and among NCFD staff and project participants, quarterly advisory committee meetings involving NCFD staff and the faculty and resident representatives of the eight programs, and the development of resource materials on faculty development. Between the time the project proposal was drafted and the project actually began, giant steps were taken in the microcomputer industry, causing speculation that microcomputers could provide considerable help with the work of the project. The following are some tasks for which microcomputers were thought to be well suited:

1. Enhancing communications (including consultations and exchange of ideas) between and among (1) NCFD staff, (2) faculty and residents at each of the eight sites, and (3) community-based physician preceptors

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2. Helping with administrative chores and the preparation of written materials for the project

3. Making possible the creation of interactive learning modules, designed to be responsive to the different learning needs, experiences, and levels of sophistication of the project participants

An operating premise of this project was that much could be gained by fostering collaboration—creating a figurative network—among the eight family medicine residencies. As will be explained, the microcomputer has facilitated this figurative network through the creation of a literal one, hence, the adopted project name—the FAC-NET Project.

### *As an End in Itself*

In addition to helping accomplish the work of the project, the use of microcomputers in the project was seen as an important end in itself. Microcomputers are quickly becoming basic tools for teachers and physicians, enhancing instruction and patient care. Indeed, in the near future it may not be possible to run an efficient educational program or physician's office without taking advantage of the resources offered by the desk-top computer. It was reasoned that a current project in faculty development for physicians should include opportunities for the participants to become familiar with the microcomputer, particularly with its potential for instructional uses, for themselves, their patients, and other learners with whom they work.

## **Evolution of the Project**

### *Introducing the Microcomputer Into the Project*

A very early step in the project was creating the Project Advisory Committee, consisting of the director and a resident representative from each of the eight participating residency programs. A prime topic for discussion at the first meeting was

the proposal to include the microcomputer, both as a means of helping with the intended work of the project and as a resource worth learning for its own sake. Potential obstacles to introducing and successfully using microcomputers in the project were also reviewed:

1. It could be anticipated that some of the project faculty members and residents, as do many in the population at large, might experience some measure of "computer phobia." Steps would be needed to help overcome any uneasiness with and resistance to computers that may emerge.

2. The faculty members and residents might have difficulty finding the time needed for learning to use the computer.

3. Very little high-quality, easy-to-use software was available, especially in the area of medical education. The services of a programmer who could help with creating new software and modifying existing, hard-to-use software would be necessary. Considerable patience with the expected slow progress of the participants would be required, particularly in the early phases of the project.

4. With the constant introduction of new computer and software products, the project staff needed to strike a balance between being over-cautious, thereby postponing all decisions indefinitely, and being insufficiently cautious, with the risk of selecting resources that rapidly become obsolete.

After carefully weighing the pros and cons of moving ahead with the introduction of microcomputers, the committee decided that the potential advantages outweighed the disadvantages and that the risks that always accompany pioneering efforts would be worth taking. With the approval of the sponsoring agency, the eight participating residency programs decided that funds that had originally been budgeted for assistance with personnel support costs at their sites should be reallocated to the purchase of hardware and software.

### *Selecting the Hardware*

After carefully investigating the hardware and software available at that time, the Apple II+

computer was determined to be the best choice. It was a versatile, highly adaptable machine that could grow with expanding needs. It had the widest range of available software and accessories. A number of formal and informal surveys indicated that in late 1981 the Apple II+ was nearest to a standard among the microcomputers in use in health professions education programs in this country.

At the next meeting of the Project Advisory Committee, it was jointly decided to purchase an Apple II+ computer for each of the eight sites. Four were already in use among the staff of NCFD.

### *Preparing the Project Sites for the Microcomputers*

Immediately prior to placing the microcomputers in the eight sites, a survey of all project faculty and residents revealed the following: of the 110 responding residents (60 percent of the total), 3 owned a microcomputer and 24 reported being able to do at least basic operations on one; of the 106 responding faculty (86 percent of the total), 5 owned a microcomputer and 18 reported being able to do at least basic operations on one. Clearly there was not a broad base of prior experience.

Each site was asked to identify one or two people, preferably one resident and one faculty member, with no prior experience with microcomputers, but with some interest in learning about them. These were to be their site's "computer advocates." They were asked to serve as liaison between their colleagues and the NCFD staff and to spearhead the installation and use of the microcomputer at their sites.

Rather than shipping the microcomputers to each site, all "computer advocates" were invited to a workshop at which they were presented with their new microcomputer, still packaged in its original box. During the workshop the participants assembled their microcomputers and practiced a variety of basic procedures. By the end of the workshop they knew how to set up their computer at home and how to help others get started in its use.

The representatives from each of the sites were

given an assortment of computer programs to take home, including several simple instructional and other software programs that demonstrate some of the computer's capabilities. Subsequently, each of the sites has been sent a word-processing program. The sites were also provided with a few easy-to-use games, with the rationale that games can be helpful in the needed process of demystifying and "detoxifying" the computer for those who want or need a gentle introduction.

### *The Electronic Network*

The microcomputer is well suited to helping with distant communication, a task faced in linking NCFD staff, the faculty and residents at the eight sites, and community-based preceptors. To enable the microcomputers to serve as tools of communication, a modem was added to the computer at each site and an additional computer was acquired to serve as the hub of the network (NET). Operation of the NET was begun with a commercially available software program. Its limitations have become increasingly evident, and the NET is now run with a substantially modified version of the original program.

Despite these considerable improvements, the operating program is proving insufficient for the growing use of the NET and the enlarging array of information available from it. An IBM PC/XT has been purchased, and a new operating program is currently being designed from scratch to provide the NET with an ease of operation and a level of flexibility unachieved with any current system examined.

The NET provides for the exchange of "mail" among project participants, allows the distribution of important project "announcements" from the NCFD staff, and gives users access to a variety of sources of information.

Upon accessing the NET, users are told when the most recent "announcement" was posted and whether they have any "mail" waiting for them. They are then presented with the NET's Main Menu, which lists a set of options from which they can make a selection by pressing a single key: A presents them with all "announcements"; H



provides help in operating all aspects of the NET; F enables them to send "feedback" (questions and comments on the operation of the system) to the director of programming, who maintains the NET; M provides a searchable listing of all current members of the NET (those who have passwords and can receive mail); E takes them to the electronic mail subsystem where they can send and receive private messages; and B provides access to the nine "bulletin boards."

Electronic mail is private correspondence with other network users. It can be sent and received at the user's convenience (the NET operates every day, 24 hours a day). When users access their mail, it is presented on their computer's video screen and is held in their computer's temporary memory (RAM), from where it can be saved in permanent memory (floppy disk) or printed out on paper, or both, if a copy is needed for later use. The NET provides for automatic reply to messages if the user wants to type a response at that moment.

A growing number of the busy physicians associated with this project are discovering the efficiency of avoiding "telephone tag" (not being able to connect with people who are away from their desks) by using send-anytime, receive-anytime "electronic mail."

The NET also provides reference information for the project participants in the form of "bulletin boards." Nine are currently available: (1) "The FAC-NET Project," a summary of and current news about the Florida faculty development project; (2) "Education Issues/Ideas," informative and provocative observations about the instructional process in medicine; (3) "Open Exchange," a free forum for the public exchange of questions, answers, and comments about topics of mutual interest among users of the NET; (4) "Florida Residencies/Clerkships," descriptions of the family practice residencies, clerkships, and preceptorships available in Florida; (5) "Florida Practice Opportunities," listings, by regions, of descriptions of all known openings for family physicians in Florida; (6) "Preventive Medicine Resource Index," references and instructional materials in preventive medicine and health education that the project sites have available for sharing, as well as resources that can be secured elsewhere (this index was created as a project of the Florida Association of Family Practice Residents); (7)

"FAC-NET Library/Computer Info," a summary of software and books available for loan to project participants and information about the operation of the project computers; (8) "Education and Computer Glossary," brief explanations of terms that might be unfamiliar to project participants; and (9) "Miscellany," a community notice board for the posting, by anyone, of anything of general interest, including items for amusement.

### *Giving On-Site Assistance*

The main focus of the teacher development workshops, held annually at each site, is the development of teaching skills. This past year, time, both during and after the workshops, was also included for consultations and demonstrations on the use of the computer. Further, at each site appropriate administrative or clerical persons were invited to attend the sessions on the computer. In most programs these people are located near the project microcomputer, have had some prior word-processing experience, and are proving helpful in introducing beginners to the use of the microcomputer.

Workshop participants have been given reference materials on the use of the computer, and a notebook containing reference and related resource materials has been placed next to the computer at each site. Cork boards placed near the computers are proving useful for posting messages from the network and cards listing the main commands needed for operating the computer and the frequently used computer programs.

### *The Project Newsletter*

A project newsletter (FAC-SHEET) is prepared 11 times a year by the NCFD staff and sent to all program participants and to a short list of interested persons outside Florida. In addition to general information and news of the project, each issue has a page devoted to a provocative or in-

formative article on some aspect of medical education and another to a short tutorial on some aspect of computer use.

The NCFD staff keeps abreast of the latest developments in microcomputer technology and software availability, passing this information on to the programs, often in FAC-SHEET. This information sometimes results in the decision to purchase new products. For example, during the current year, the staff's ongoing evaluation of newly available software led to the purchase of ThinkTank (a new "idea processing" tool) and Bookends (a tool for developing and maintaining computer-based bibliographies).

### *Monitoring the Process*

A key to the success of the project has been the active participation of members of the Project Advisory Committee. The committee meets four times a year to review the work of the total project and the specific developments at each site. As would be expected, each site is proving to be unique, with faculty and residents at widely different levels of interest and sophistication in education and computer utilization. The discussions of what is working and what is not working at each site provide program representatives with new ideas for their programs.

### *Projects Under Development*

The total FAC-NET faculty development project has multiple components that were not described here. In the computer component of the project, the main focus during the first two years has been on setting up effective systems (eg, designing and redesigning the NET) and helping faculty and residents become oriented to and comfortable with using computers. During the next two years the focus will be mainly on a major redesign of the NET and on creating instructional materials, particularly IMPs (instructional man-

agement problems), PMPs (patient management problems) and programs designed for helping faculty and residents review videotapes of instruction and patient care.

A new project sponsored by the same agency, a "Family Practice Learning Resource Center," will involve creating instructional packages for predoctoral training in family medicine. Many of these packages, which will be field-tested and shared among the eight programs, will be microcomputer based. Students at the eight sites will also be able to use the FAC-NET network. The bulletin boards on residencies, clerkships, and preceptorship opportunities were developed with the students in mind. Students wanting more information about these or other opportunities can correspond on the NET with faculty and residents from the eight project sites and with students from the three Florida medical schools.

### **Lessons Learned**

Probably the most important achievement of this project to date has been the refined understanding gained about how to fulfill the project's goals. The following are some of the highlights:

*Microcomputers can be enormously helpful in accomplishing many instructional and administrative tasks.* A central activity of academic people is writing. Whether creating instructional material, articles for publication, reports to colleagues, or letters of referral, committing words to paper is a dominant part of many educators' lives. The word-processing capability of the microcomputer is transforming how these tasks get done. To be done well, writing involves extensive rewriting.<sup>1</sup> By providing writers with the facility to do multiple, rapid revisions, automated spelling checks, and more, the microcomputer can enhance the quality of writing while substantially reducing the effort and time involved.

In addition to transforming the ways medical educators do their instructional and administrative writing, microcomputers are being used by the NCFD staff and a growing proportion of the faculty at the eight project sites for other administrative tasks, such as budget planning and manage-

ment, record keeping, night-call scheduling, and bibliography organization.

A resident at one of the sites wrote the program being used for developing resident on-call schedules, now in use at several project sites. Two staff members at another site developed a program that is now being used at most sites to help residents keep track of the clinical procedures they do. These well-organized records may prove to be of considerable help with the process of certification and for securing future hospital privileges.

*Physicians are not immune to "computer phobia."* The public media have drawn considerable attention to "computer phobia." While hardly a formal clinical condition, this phrase is meant to imply a widespread attitude that varies from reluctance to confront the task of learning to use computers to overt physiological signs of anxiety when faced with trying to use one. The net result is avoidance. Close observation of many of the project participants suggests that physicians may be even more prone to discomfort with computers than are others. Computers are very literal devices and can be quite unforgiving in their demand for precision. No one likes to make mistakes or to be in a position of feeling inadequate. Many of the experiences in medical education seem to contribute to an uncommonly high tendency among physicians to avoid situations that cause feelings of inadequacy.

As anticipated before starting the project, there were (and still are) faculty members and residents who experience varying degrees of computer phobia. Some residents have even said they think they are too old to learn to work with computers, that this task should be left to younger people!

The games that have been provided seem to be of some help for some of the faculty and residents. It is even important to try to achieve a game-like character in instructional materials that are developed. This is not to suggest a frivolous or trivial approach. Rather, when possible, the design should include humor, graphics, sound, immediate positive feedback, and a sense of fun.

*Almost none of the currently available software or hardware is yet as user friendly as it would need to be to accommodate to the busy schedules and discomforts of most physicians.* Computer documentation (the written instructions provided with most software programs) is typically poorly organized, excessively technical, and difficult to use

when searching for answers to operational questions. Many users turn out to be uninclined to read written documentation, even if it is reasonably clear; they are typically impatient to get on with using the software program directly.

Too many programs require users to memorize a list of commands to operate the computer. It is difficult for most users to remember such commands, especially those people who, like most of the participants in this project, are not using the programs on a daily basis—a situation not unlike the risk of depending on one's memory for medical information that is not being used regularly.

Most of the externally available programs reviewed do not take full advantage of the computer's capabilities. Some are largely linear, presenting volumes of text material with minimal branching, essentially serving as electronic page turners. There is a good deal of judgmental feedback ("WRONG!", or, "YOU SHOULD KNOW BETTER THAN THAT!"), which does little to invite people to come back for more. Most programs are not well error-trapped; the beginning user is prone to causing the program to "crash" from an inadvertent key-press, which does little for someone who begins with distrust or fear of technology.

*To be effective and attractive to beginners, instructional software must have specific characteristics.* Documentation should be well-indexed, brief, and clear, using nontechnical language. Operation of the program should be based on "menus" of available choices, with no requirement for memorized commands. Clear operating instructions should be available on the screen. When appropriate, the program should have engaging embellishments, such as graphics, sound, and humor. There must also be maximum protection from user-induced errors and an absence of negative feedback to users. In longer programs, discrete sections should be provided, enabling users who cannot complete a program in one sitting to stop and re-enter the program later, at a stage of their choosing, rather than having to start over again.

*An electronic network can provide for efficient, rapid exchange of information and resources among physicians and others.* Electronic networks for access to information (eg, the MEDLINE bibliographic data base) are developing rapidly. In addition to the widely used general



subscription services (eg, CompuServe and The Source), a growing number of specialized medical services are becoming available. The most prominent among them is the AMA-supported GTE Medical Information network (MINET). All such networks are founded on the premise that the rapidly increasing use of microcomputers in the general population will lead to an era when people will exchange "mail" and gain access to needed information through the use of their microcomputers linked to telephone lines.

Experience in the FAC-NET project is lending substantial credence to that assumption, with some modifiers. Although incredible efficiency is possible with the use of an electronic network, the process of achieving widespread use is not automatic. As with instructional software, the operation of the network must take into account the characteristics and preoccupations of the users. Some of the following lessons learned from this project may be useful for design of the new network:

1. All the characteristics needed in good software (eg, ease of use, menu control, protection from errors) must be part of the network design.

2. The information bases (current bulletin boards) must be able to be searched easily by topics and by key words.

3. Provision is needed for automatic distribution of mail to preidentified groups (eg, a memo can be sent, with a single command, to all residency directors, or to all chief residents).

4. Anyone checking into the NET from any participating site must be able to determine whether there is mail waiting for anyone else from that site, so that the intended recipients can be alerted.

5. Anyone who has sent mail must be able to determine whether it has been "picked up" by the intended recipient(s).

Even without these attractive additions, those who are regular users of the NET are discovering the magic of being able to send a document back and forth between two distant points for review and editing three times in the same half-day. For the NET users, the large state of Florida is steadily shrinking. The recent installation of an in-state 800 number, providing toll-free access to the NET for the seven sites outside Miami, is contributing to the expanded use and efficiency of this vehicle.

With the help of the NET, faculty and residents in the eight programs are enhancing their collabo-

rative working relationships in the area of faculty development. By all indications these collaborations will survive and continue to grow well beyond the termination of funding of the FAC-NET project.

*Computers have the potential of providing dynamic, interactive learning experiences.* Effective learning requires a set of conditions that are not always provided in medical education settings.<sup>2</sup> For many of the goals of medical instruction, learners need opportunities for repetitive practice of specific skills and accurate, prompt feedback on the effectiveness of their efforts. There are many skills that are not easily practiced as often as needed in usual medical school or residency settings (eg, solving complex clinical problems, analyzing unusual diagnostic information, explaining bad news to patients). Live teachers are often not available when needed and too often are not suitably equipped to provide the constructive feedback learners require.

The microcomputer, either alone or linked to a video-playback device (cassette or disk), if suitably programmed, can provide many learning opportunities more conveniently and more reliably than would otherwise be available. Early experiences in this project have led to the formulation of several instructional packages that will be under active test during the current year.

*At this stage in the evolution of computers, it is important to have a competent programmer or computer specialist as a member of the staff.* Contrary to the image projected by many computer companies, there is very little hardware or software that yet operates easily. Almost every aspect of using computers still needs the careful attention of a knowledgeable, devoted person. To go beyond merely operating prepackaged items toward designing high-quality, easy-to-operate materials requires substantial expertise well beyond that which is likely to be offered by someone fresh out of a computer course. The FAC-NET project could not have been possible without such a person as a member of the NCFD staff.

*It is important to have "computer advocates" at remote sites where computers are being introduced.* Despite the rapid escalation in media attention to the computer revolution and the general enthusiasm emerging in this country, few of the faculty and residents in the eight sites (which are probably somewhat representative of others)

have taken spontaneous initiative in pursuing the steps needed to learn and to stay current in using the computer and its accessories. The dominant issues appear to be some mix of excessive clinical demands and computer phobia. At least one person who can exert leadership in helping others become enticed by or overcome their resistance to the potential of this new technology has been required at each site. The growing enthusiasm among project participants at most FAC-NET sites would not have been achieved with only the efforts of the geographically removed NCFD staff.

*Substantial time and patience must be allowed when introducing computers into a teaching program.* Even with the efforts exerted by the NCFD staff through workshops, a monthly newsletter, and quarterly meetings, combined with the on-site efforts of the project's "computer advocates," progress in computer and network use has been slow. In balance, that there now are some regular users at every site, that the number of computer owners has doubled, and that some participants have made substantial contributions in creating useful software programs must be seen as appropriate progress.

The experiences of this project have made clear that a substantial adjustment is required for a residency program to negotiate a transition into the "computer age." The process of helping others decide whether computers can be genuinely helpful to them and, if so, to take the steps required in learning to use this equipment seems painfully slow at times. The lesson seems to be that the medical education setting does not now have the dramatically visible needs or the capacity for adaptation that is evident in many executive offices in many industries, where the microcomputer is being adopted with great eagerness. A companion lesson for the developers of computer software and electronic networks may be that usefulness and ease of use must be made more evident before the speed of adoption is likely to accelerate.

## Conclusions

There is no denying that the microcomputer and the computer revolution have arrived in this cul-

ture and are here to stay. There are those who assert that the impact of these developments on Western society will be greater than that of the machine and the industrial revolution. The machine multiplied the effectiveness of people's muscle power, permitting physical work to be done far more efficiently. The microcomputer is now extending the capabilities of human brain power, permitting a wide range of intellectual tasks to be done far more efficiently, and permitting some tasks to be done that were not possible previously. While the potential of the microcomputer appears enormous, its realization thus far in medical education has been modest.

The Florida FAC-NET project has begun to assemble a fairly wide base of experience in the process of introducing and using microcomputers as part of a faculty development project incorporating faculty and residents in eight family practice residency sites. This experience demonstrates that there is enormous potential in medical education for the microcomputer, but that it may not be reasonable to expect rapid fulfillment. Distractions from undertaking new activities are considerable for most faculty and residents, and for many the reluctance to learn to use computers is substantial. It is clear that the pace of adoption will accelerate when the computers and the software programs that are available are very easy to use and genuinely functional. Many physicians, at both the residency and the faculty level, are not yet ready to exert much initiative, but they are likely to be responsive to the increasingly user-friendly materials that are now emerging.

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## References

1. Jason H: Will computers dehumanize medical care and education? *J Fam Pract* 17:525, 1984
2. Jason H, Westberg J: *Teachers and Teaching in US Medical Schools*. New York, Appleton-Century-Crofts, 1982