

# Development of the Personal Computer Assisted Library Instruction Series Rx for Pharmaceutical Science Research™ Programs

Patricia A. Piermatti

## INTRODUCTION

In 1970, the Rutgers University College of Pharmacy moved to its present location on the Busch Campus in Piscataway, New Jersey. Over the years, the Busch Campus has become the main science campus of the university. Since the fall of 1970, the Library of Science and Medicine has been the primary provider of library materials and library instruction for the students and faculty of the Rutgers College of Pharmacy. In addition to its rich pharmaceutical sciences resources, the library has collections covering the biological sciences, chemistry, engineering, geology, medicine, and psychology.

Library instruction for each freshman class of approximately 180 students has varied over the years. In the early 1970s, library tours were arranged with groups of 15 to 20 students each. Tours took about 45 minutes and were mainly orientational in nature. On each tour, about 20 minutes was expended on rather cursory explanations of the use of periodical indexes and abstracts such as *Cumulated Index Medicus* and *International Pharmaceutical Abstracts*. A few comments about specialized pharmacy reference works such as the

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Patricia A. Piermatti, M.S.L.S., is Pharmaceutical Sciences Librarian and Science Libraries Coordinator of Collection Development at the Rutgers University Library of Science and Medicine, Piscataway, NJ 08855.

*U.S. Pharmacopoeia*, *Drug Facts and Comparisons*, and *Meyler's Side Effects of Drugs* were also included in this 20 minutes.

As scheduling of these tours of the library became more difficult, the Dean of the College of Pharmacy reorganized the "Foundations of Pharmacy" course curriculum. The library tours were replaced by a lecture on pharmacy bibliography. Taught in the mid- to late 1970s by an instructor at the College of Pharmacy, this lecture provided the freshmen with a good working knowledge of library resources in pharmacy. Lecture material was gleaned from several sources, including *Remington's* and consultation with the Pharmaceutical Sciences Librarian.

I assumed my present duties for collection development and management, reference, and on-line database searching in the pharmaceutical sciences (including industrial hygiene and toxicology) in May 1973. By 1980, the "Foundations of Pharmacy" bibliography lecture had also become my responsibility. Over the years, I prepared substantial handouts, including an annually revised selected bibliography. I made transparencies to illustrate the features of the indexes, abstracts, and reference works that, in the past, were shown to students on the library tours. These handouts and transparencies provided initial ideas and examples upon which to build a new way of presenting library instruction to Rutgers pharmacy freshmen: computer-assisted instruction (CAI).

Beginning in the fall of 1989, three modules have been available to undergraduate and graduate students of the College of Pharmacy (over 700 FTE students). These modules are "An Introduction to *Drug Literature Index*," "An Introduction to *Index Medicus*," and "An Introduction to *International Pharmaceutical Abstracts*."\* Additional programs explaining other abstracting or indexing resources specific to pharmacy are in the planning stages. I will also be writing PILOT scripts, the purpose of which will be to convey

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\*Each module is contained on a single 5 1/4" diskette and runs on IBM PC, XT, AT (or compatibles) with DOS version 2.10 or later. Color and monochrome versions of each program are supplied. For information and an order form, please write to the author at Piermatti Educational Resources, 46 Earnshaw Place, Clifton, NJ 07013-4210.

basic library skills.\* My purpose in creating CAI for both general library skills and specific resource-related skills is to provide students with pharmacy library instruction that is not only more comprehensive but also more interesting than our traditional, single-session, large lecture setting. Another important advantage is the ability of students to repeat any CAI program as frequently as necessary to master a particular concept.

### **DISADVANTAGES OF LARGE GROUP LECTURES**

It became increasingly apparent to me that the rate of return (i.e., amount of library instruction information retained by students) for the two working days of annual lecture preparation time was decreasing as the years passed. Disadvantages of the large group lecture setting for the library's instruction program for pharmacy students involve both the Pharmaceutical Sciences Librarian and the students themselves.

Enrollment has remained strong for the Rutgers College of Pharmacy. Support staffing for the Rutgers libraries is not at levels recognized by other major research libraries; therefore, two days of preparation time (lecture writing, revising selected bibliography, word processing, photocopying, collating, and stapling) for approximately 180 students is not unusual. However, this task competes with other multidimensional responsibilities for an academic librarian's time. Bibliographic instruction competes with collection development; reference desk duty, including evenings and weekends; online database searching in biomedicine, pharmacy, and toxicology; and various committee assignments and attendance at meetings.

Pharmacy freshmen are disadvantaged in several ways. Limited lecture time affects the content of pharmacy information presented to students during one class period. Lectures have been more general and introductory. In addition, the lecture site is outside the library, and the library lacks a room large enough to accommodate

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\*These programs are complementary to the independent work of a colleague at the Library of Science and Medicine who is using Apple Hypercard™ software to develop library CAI. See: Kesselman M. LSM Infomaster: a Hypercard CAI program on a Macintosh network. *C & RL News* 1988;49(7):437-40.

the students. Variability of the lecture date during the first semester of their pharmacy studies does not always permit students to immediately apply the information given in class.

Considering the five-year, highly-structured curriculum for pharmacy students, library instruction has historically fallen into the "Foundations" course taught during the first semester. Notwithstanding the appreciation and support of the dean and the pharmacy faculty for the library, most of these pharmacy students will not have opportunities to apply what they are taught until the latter two years of the program. Although this is an inherent problem in highly-structured curricula, the lag time is too long for students to remember the fine points of library sources for pharmaceutical research.

Additionally, I have noticed the unevenness of the library skills brought to college by the pharmacy students and the related disinterest of some in the annual presentation. This may, perhaps, be attributed to several factors. First, my lack of training in educational theory may account for dry, unentertaining lectures. Second, freshmen come to college having less reliance upon books for information and more dependence upon television and video for entertainment and learning. Third, library skills may not be emphasized as much as they were previously at the secondary level. Insufficient resources and a shortage of school librarians resulting from funding constraints may also be contributing causes. But a bright note in the midst of this lack of library skills has been a noticeable increase in computer literacy.

### **ADVANTAGES OF COMPUTER-ASSISTED INSTRUCTION**

A review of the literature reveals some advantages of computer-assisted instruction for the pharmacy library setting. CAI overcomes the limitation of inadequate staffing and time consumed by available staff for developing and implementing an appropriate library and bibliographic instruction program (1, 2). It also overcomes the space limitations encountered in large group lectures. CAI meshes with the entire pharmacy curriculum, rather than only one course, and it provides individualized instruction without add-

ing another course to a full curriculum (3). This type of instruction is self-paced, allowing presentation of detailed facts and review whenever necessary (3, 4). With CAI, learning takes place nearer to the use of the material learned (5). Also, students are more motivated to learn through the use of computer-assisted instruction (6). As an adjunct to traditional educational methods, CAI can be tailored to suit both general library skills and fact-based library research needs (4, 5).

In thinking about these advantages, we see that the factors of time and personnel are not avoided. Sufficient quantities of both guarantee good CAI programs (2). However, the time one spends preparing a CAI program is not without dividends. Well-written programs contain interactive features that can hold a freshman's attention far better than a librarian's lecture. Computer-assisted instruction allows for greater personalization and individualization than large group lectures. In contrast with the experience of liberal arts majors, library instruction for pharmacy students, as well as other science and technology majors, is enhanced by the use of computers (2, 6). As an adjunct to traditional educational methods, CAI is an excellent vehicle by which to present the more fact-based library instruction required by health sciences library users (4). This instruction is not limited to a single, large group lecture in the first semester but may be repeated whenever necessary throughout the years of undergraduate and graduate study. Learning is not restricted to the lecture hall: it may take place in a student's room on a personal computer, or it may take place at the library on microcomputers. Finally, CAI is a means for archiving a health sciences librarian's subject expertise.

#### **DEVELOPMENT OF THE PERSONAL COMPUTER ASSISTED LIBRARY INSTRUCTION SERIES Rx FOR PHARMACEUTICAL SCIENCE RESEARCH™**

Although literature describing a fairly formalized CAI production process exists, my less-formalized experience is not unlike the guidelines described by FitzGerald, Arnott, and Richards in their 1986 paper (1, 7). These guidelines include deciding what to teach, deciding on the audience, deciding whether the lesson will be institu-

tion-specific, determining ownership of the lessons, selecting the hardware, selecting a programming language, deciding what modes of instruction are appropriate, writing an outline of the lessons, deciding upon the author(s) of the lessons, making time to write the lessons, and having the scripted lessons reviewed.

Development of the CAI programs (not necessarily in the order above) began in the fall of 1984 with the purchase of an IBM PC/XT with 640K RAM, a modem, and a printer for my home office. Hardware selection was predicated upon the widespread use of IBM microcomputers at the university. For at least a year prior to purchasing my own personal computer, I had been contemplating the library uses I could make of it. A major use would be pharmacy library instruction. At first, my audience was to be Rutgers College of Pharmacy undergraduate and graduate students. In the three and one-half years it has taken me to write the lessons, my audience has enlarged to include pharmacy faculty and staff, pharmaceutical company R&D and marketing personnel, and public librarians. These first three modules of a planned series are topic specific and may be used wherever there exists a need to know what information is available in *Drug Literature Index*, *Index Medicus*, or *International Pharmaceutical Abstracts*. John Barber and others, in their comparative study of the indexing of pharmacology papers, used the first two titles in arriving at their conclusions. *International Pharmaceutical Abstracts* was considered too specialized for inclusion in the Barber study (8). However, given Rutgers pharmacy students' dependence upon these indexing resources for class assignments and term papers, I decided to undertake the task of explaining their use—"operational training," in Wanger's words (9). This was my personal decision, made independently in early 1985, about 18 months prior to my becoming aware of a related CAI package (10).

Selection of an authoring language next engaged my interest. IBM PILOT Authoring Language (version 1.00) by Larry Kheriaty was selected over LOGO, which was initially considered. A history of PILOT (Programmed Inquiry, Learning or Teaching) reveals the availability of several versions in addition to IBM PILOT (11, 12). Each version has advantages and disadvantages (3, 12, 13). One

powerful advantage of PILOT is the "Match" command, which allows even misspelled, but correct, responses to be accepted by the program. The National Library of Medicine uses a version called PILOTplus to write some of its CAI programs.

IBM PILOT has helped me to transform a folder of lecture notes and overhead transparencies into CAI lessons that average 40 to 60 minutes in runtime. As I outlined my CAI lessons in longhand, it was often difficult to avoid my familiar notes; however, as I typed the scripts at my personal computer (without using screen design worksheets), I also considered my experience with the printed versions of the reference works, vendor materials, on-line searching, vendor seminars, and student questions at the reference desk. Both library and College of Pharmacy colleagues graciously tested my CAI programs and made useful suggestions, which have been incorporated into the current version (1.00). Scripting has taken considerable time, and the one-year sabbatical I was granted by the library gave me the extra time I needed to commence this project. I do not regret spending hours to learn PILOT programming, and I look forward to scripting new lessons with this authoring language in the near future.\*

A word about copyright may be in order. As all development expenses such as hardware and software have been borne by me personally, as CAI may be considered just another intellectual endeavor, and as I am self-publishing these CAI programs, I have decided to retain copyright. Accordingly, in 1989, upon consulting texts, I filed and received U.S. Copyright Office certification (14, 15). Free sets of all three tutorials have been distributed to appropriate libraries within the Rutgers University Libraries system. Two sets have been given to the Library of Science and Medicine. Most importantly, over two dozen sets have been donated to the Rutgers College of Pharmacy. Eventually, tutorials may be made available for sale along with other pharmacy texts through the

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\*PC/PILOT version 4.3 by Larry Kheriaty, available from Washington Computer Services in Bellingham, Washington may be employed because of enhanced features.

University Bookstore. Phase I of direct-mail marketing is targeting biomedical libraries and pharmaceutical firms.

### ***A DESCRIPTION OF THE PROGRAMS***

The three 5 1/4" floppy diskettes that presently comprise my Personal Computer Assisted Library Instruction Series are defined as conventional CAI, and each contains a tutorial mode that gives users the opportunity to answer questions (16). Barbara Rosenfeld writes that "PILOT fosters a tutorial instructional strategy" (12). Within tutorials are "sequences of instructional elements" that comprise what Conlon defines as a "standard segment" (12). FitzGerald, Arnott, and Richards summarize these instructional elements as:

1. Presentation of information in uncrowded displays
2. User control of the pace of the lesson
3. User has frequent interactions with the computer
4. User given opportunity to supply correct answers before the lesson continues
5. Program provides helpful feedback when questions are not answered correctly
6. Program includes a table of contents or a menu. (7)

Each of the six programs currently available in my series contains an average of 1,649 lines of text (36,747.5 bytes on average). This translates into over 75 screens of data for each program. After screens giving title and acknowledgment information, an instructional screen tells the user not only how the program advances (automatically or manually) but also how to exit the program (by typing CONTROL C). Automatic advancing (not requiring a key-stroke) occurs when there are title screens. There can also be automatic advancing when the program has received a typed response to a question posed to the user. Manual advance is employed whenever screens presenting textual information occur. By pressing the RETURN key, each user can manually advance the program at his or her own natural pace.



In each of the programs, the table of contents screen follows the instructional screen. Below is an example taken from the "An Introduction to *Drug Literature Index*" program.

AN INTRODUCTION  
TO DRUG LITERATURE INDEX

TABLE OF CONTENTS

1. INTRODUCTION
2. ALL THE INDEXES
3. AUTHOR INDEX
4. CLASSIFICATION INDEX
5. MANUFACTURERS INDEX
6. PHARMACEUTICAL INDEX
7. TRADE NAMES INDEX
8. BIBLIOGRAPHIC CITATION

REMEMBER, EXITING THIS PROGRAM IS EASY. SIMPLY TYPE "CTRL C" (CONTROL C).

Periodically throughout the tutorials that follow the table of contents screens, users are given instructions on how to return to the table of contents. This usually occurs at the conclusion of each section or chapter of the tutorial, thereby allowing users to review preceding sections before proceeding. Also, if users require more than one CAI session to complete any one of the three tutorials, the table of contents allows them to skip over those sections they have already mastered.

Although each of the three available modules presents more textual information than was ever possible in a lecture situation, users are kept from boredom by the interspersed questions (totaling no more than 20) throughout the tutorials. Questions may require factual, true/false, or multiple-choice answers. User answers are tallied at the end of each program. The textual information is either specific to *Drug Literature Index*, *Index Medicus*, or *International Pharmaceutical Abstracts*, or it is general and gives the user some basic library research ideas. Additionally, definitions relevant to the

content of the material are given, as well as interesting historical facts. The primary goal is user mastery of pharmaceutical science research skills. A secondary goal is to have the user enjoy a nontraditional teaching method.

### **IMPLEMENTATION AND EVALUATION OF THE PROGRAMS**

During the fall semester of 1989, the Dean of the College of Pharmacy at Rutgers received 15 sets of tutorials for use in his "Foundations of Pharmacy" course. Each set contains 5 1/4" floppy diskette copies of "An Introduction to *Drug Literature Index*," "An Introduction to *Index Medicus*," and "An Introduction to *International Pharmaceutical Abstracts*." Printed documentation included with each set includes a six-page user manual, an instruction card for hard disk system users, an instruction card for dual floppy drive system users, and an evaluation form. Following prior practice in the "Foundations of Pharmacy" course, I included copies of the latest edition of the library's selected pharmacy bibliography for distribution to the students, and I provided a quiz and answer key. In this case, however, the quiz consists of 12 questions taken directly from the 3 tutorials. These questions can be used separately or incorporated into a final exam. The dean's office made arrangements for me to speak about the tutorials at a faculty meeting, and I arranged demonstrations for interested faculty. With upper-level pharmacy student use in mind, additional sets were distributed to departmental chairpersons. Bibliographies, the quiz, and an answer key were also distributed upon demand. Initial heavy use of the tutorials by graduate students is expected.

As these tutorials are serving as a replacement for a lecture, it is important to evaluate this new library skills teaching method. Therefore, each student or faculty member who uses the tutorials is being asked to complete a very short evaluation form. After at least two semesters of use, these written evaluations will be summarized in a formal report. New versions of the tutorials will take into consideration these comments. In a sense, the evaluation form takes the place of immediate feedback from students in a traditional lecture

setting. As a teacher of library skills, I cannot escape evaluation. Whether this comes in the form of a yawn or the written word, I am accountable to the future pharmacists whom we as pharmacy educators are teaching. However, our teaching must not remain in the static paths of familiarity but must venture into new technological pathways.

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