The Use of Computer-Assisted Teaching Systems (CATS) in Pharmacology

John Doull and Edward J. Walaszek

The general rule of study is that time is a constant and achievement a variable. Since the study of drugs by physicians must be a lifetime endeavor we will begin by instituting achievement as the constant and time as a variable.

Introduction

Computers are now used extensively in education at the primary, secondary, and collegiate level but relatively infrequently in medical education, and it has been suggested that this is because computers are not applicable to medical education. However, several such programs have been developed in the past five years in internal medicine and a few in biochemistry, pharmacology, and anatomy (Abelson, 1972; Alpert and Bitzer, 1970; Hyatt et al., 1972; Murray et al., 1976; Norton et al., 1972; Smith and Sherwood, 1976; Stolurow et al., 1970). Associated with the growing interest in this area, several professional groups, such as ADCIS (The Association for the Development of Computer-Based Instructional Systems), and governmental agencies, such as the Lister Hill Center for Biomedical Communications of the National Library of Medicine, have arranged meetings, workshops, and various other programs designed to encourage, support, and coordinate some of these activities. It is now evident that computers can support medical education directly through computer-assisted instruction (CAI) and through computer-managed instruction (CMI) and indirectly through the establishment and maintenance of exam question data banks, machine scoring of examinations, and the availability of sophisticated programs for analyzing student and faculty performance and the effectiveness of different educational methodologies, as well as other educational problems. It is equally clear that the use of computers in medical education will increase dramatically during the next decade and that this growth will be accompanied by technological advances that will have an even greater impact on all aspects of the education of health professionals (microprocessors, intelligent terminals, inexpensive communication networks, massive storage devices, combined video—CAI techniques, etc.).

John Doull and Edward J. Walaszek · Department of Pharmacology, University of Kansas Medical Center, Kansas City, Kansas.

The purpose of this chapter is to describe a computer-assisted teaching system (CATS) that was developed in the Department of Pharmacology at the University of Kansas Medical Center in 1970 and that has been subsequently used and further developed by a group of cooperating United States and European medical schools.

Prior to 1970, the pharmacology courses at the University of Kansas Medical Center for both the medical and the nursing students utilized a conventional approach (a series of lectures, laboratories, and one or more examinations). The stimulus to change our teaching approach resulted from several factors: an increase in the medical student class size from 115 to 200 students, a switch from a 4-year to a 3-year medical school curriculum, and a growing demand for additional courses in pharmacology from nursing and allied health and from outside the institution. These requests for additional instruction in pharmacology, and particularly the demands for more continuing education and in-service training programs, are typical of the current trend among health professionals at all levels to seek new and more effective ways to improve their skills and to anticipate new relicensing requirements. In designing a system, therefore, to handle both our current and projected teaching needs in pharmacology, we were seeking not only a more effective way to teach pharmacology to medical and nursing students, but also an effective and innovative method for meeting the needs of medical technicians, hearing and speech therapists, graduate students, pharmacists, house staff, and other health professional groups, both within and outside of the Medical Center.

Five major objectives were identified as being essential for our teaching program.

1. The pharmacology courses must be easily available at any time throughout the year to students within and outside of our institution.
2. The programs must be able to handle students with different levels of preparation.
3. Students must be able to progress through the courses at varying speeds (self-paced).
4. The system must provide for frequent and rapid feedback on progress through each course.
5. The teaching program should utilize newer educational technology and techniques to provide optimal flexibility in the student approach to learning pharmacology.

It was anticipated that a teaching program which fulfilled these objectives would provide a satisfactory answer to one of the major criticisms of basic science teaching in the medical schools, namely, lack of flexibility or lock-step curricula. We were also concerned, however, about a second common criticism of basic science teaching, which is the so-called gap in knowledge problem. In a conventional pharmacology program with one or two examinations, it is possible, for example, for a student who is well versed in the pharmacology of morphine to pass the examinations even though he has a deficiency or a gap in his knowledge about penicillin. Many medical school programs have attempted to solve this problem by defining a series of educational objectives for each course and requiring students to meet each