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**The application of computer-managed instruction in elementary
and secondary schools**

Shedlosky, Gerald John, Ed.D.

The University of Nebraska - Lincoln, 1987

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PREVIEW

THE APPLICATION OF COMPUTER-MANAGED INSTRUCTION
IN ELEMENTARY AND SECONDARY SCHOOLS

by

Gerald J. Shedlosky

Presented to the Faculty of
The Graduate College in the University of Nebraska
In Partial Fulfillment of Requirements
For the Degree of Doctor of Education

Major: Interdepartmental Area of
Administration, Curriculum & Instruction

Under the Supervision of Professor F. William Sesow

Lincoln, Nebraska

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The Application of Computer-Managed Instruction in

Elementary and Secondary Schools

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PREVIEW

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THE APPLICATION OF COMPUTER-MANAGED INSTRUCTION
IN ELEMENTARY AND SECONDARY SCHOOLS

Gerald J. Shedlosky Ed.D

University of Nebraska, 1987

Advisor: F. William Sesow

The purpose of this study was to determine the current uses of computer-managed instruction (CMI) in elementary and secondary schools in comparison to the uses suggested in the professional literature. A review of professional literature in the area of computer technology was conducted to determine the functions and characteristics of functions of CMI. The identified CMI functions included record keeping, testing, reporting, and prescription. The characteristics of these functions were used to develop the survey instrument, The Application of Computer-Managed-Instruction in Elementary and Secondary Schools. The population of the study was identified by the educational technology representative of each state as users of comprehensive CMI systems. Respondents indicated which CMI characteristics identified in the professional literature were found in their CMI systems. Study participants indicated that about half the CMI characteristics identified in the professional literature were being implemented in their respective systems.

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Their contributions in this area of education will serve as a foundation for further research.

A special word of thanks to Dr. William Thurmond and Dr. Maxine Jorgensen for providing critical reviews of the study whenever needed.

G.J.S.

PREVIEW

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CHAPTER 1

INTRODUCTION

At the opening of the 1985-86 school year 91 percent of all public schools were using computers (Today's Education, 1986). This figure, up from 16 percent in 1981, fulfills projections of a movement toward universal acceptance of computers in schools (Papert, 1981). While Papert saw each school having at least one computer and the more adventurous thinking in terms of one in every classroom, he believed one per child would be a more accurate formula for the future. The superintendent of the Cupertino, California Schools predicts that by the end of the decade the school district will give each child two computers to each child at the start of school, one for school and one for home. Papert suggests, "The computer can and should come to be as commonplace as the pencil" (p. 5).

Power (1983) contends that seventy percent of teachers felt computers improved interest, motivation, attention span, self-confidence and cognitive learning. "Only a minority, nowadays, fear that these glamorous machines will make them obsolete" (p. 4). This change in attitude is reflected in the increased computer usage noted above. Elementary and secondary schools were using over 1.6 million computers in 1985. While

the home personal computer market has slumped, schools continue to increase their numbers.

The nature of computer usage needs to be determined now that its presence is established. Simple administrative tasks such as student and staff record-keeping, scheduling, and payroll matters have been handled by computers for years. Student programming of computers has drawn much attention with the ready availability of microcomputers, preparing them to enter a world requiring such skills. Computer classes that were once only a small part of the secondary school math curriculum are now among the most popular offerings and have led, in some cases, to the formulation of computer science departments.

Computed-Assisted Instruction (CAI) seems to be the most common element of usage for this newest technological innovation. Kukil (1983) reports computer-based instruction does increase student performance. "Students do learn as well or better from educational technology than from conventional means" (p. 122). Kukil does not specify what it is about CAI that makes it effective. One could not say that the quality of the software holds the answer as it seems to be less than first rate. While educational publishers traditionally take five years developing text books, they are now rushing educational software to market

with far less developmental time. School districts are just as eager to purchase them.

Assisting teachers in the management of instruction is a task performed by the computer. This task would include testing, diagnosing, prescribing and reporting information. Business and industry have been handling large amounts of data necessary to their operations since the middle 60's. It is this ability to store and process large quantities of information that could prove the most valuable aspect of computer use in schools. Botterell (1982) sees computer-managed instruction (CMI) as the answer to education's difficulties with individualization. He notes that individualization has received lip service for decades, while very few classrooms can truly be said to be meeting each individual student's needs. High pupil-teacher ratios and an expanded curriculum have made management of a truly individualized program nearly impossible. CMI can meet this need to manage information in education as it has in business and industry.

The National Task Force on Educational Technology (Ridley, 1986) sees CMI as one of the appropriate uses of technology. The computer should be used "to enable teachers to manage a learning environment in which learning is tailored to fit each student's needs and

progress is based upon prescribed levels of achievement." In their concluding comments the task force sees "the greatest promise of technology is that it has the capability to manage and deliver learning geared to the needs of each student."

Practical applications of CMI can be seen in various elementary and secondary schools throughout the country. Power (1983) cites Cooper Elementary School in Tulsa, where computers analyze English pretests given early in the year, determining each student's needs and what materials to use in improving specific skill deficiencies. Students return to the computer to test for any improvement in skills, while printouts based on these new evaluations are generated for parents and for future reference by teachers.

While the Tulsa use of computers certainly seems to justify further examination of CMI, McIsaac and Baker (1981) report more extensive teacher assistance being provided by computers in McFarland, Wisconsin. Students were regrouped every two weeks in reading, math, and science in this IGE setting. The regrouping of two hundred students in reading required ten hours of work from each of five teachers. Regrouping efforts like this make individualization difficult. By way of contrast the computer produced far more complete grouping recommendations in an hour or two. Students

experience a program tailored to their specific needs, while teachers spend more time at the teaching task. Brudner (1983) states, "It is all the testing and clerical work that have traditionally overwhelmed the teacher and held back earlier systems of individualization developed as early as the 1930's" (p. 26).

Several major publishers have produced large CMI systems. They can maintain records on thousands of students, serving large schools or an entire school district. The systems operate on minicomputers with a cost upwards of \$40,000. The potential exists to test entire classes in subject areas, determine individual needs, and designate appropriate activities and exercises to meet these needs. The teacher does the actual prescribing, using the information generated by the computer in making these decisions. Doctors are using a similar approach with patients. The symptoms are entered and the computer suggests possible diagnoses the physician might not have recalled (Thompson, 1984). These systems offer teachers as well as doctors much needed assistance.

When examining the merits of CMI, Baker (1978) declares that the computer component within CMI is for the benefit of the teacher, not the student. The student derives a benefit from the computer only

insofar as it allows the teacher to improve the delivery of instruction. Providing the means to manage information within the context of the total educational system is the real power of CMI. The degree that a teacher wishes to computerize the management of instruction will vary from class to class, but should intensify as computers become a more familiar part of the school environment.

PURPOSE OF THE STUDY

Computer-managed instruction has the computer performing the management tasks of testing, record-keeping, prescription, and reporting. These four tasks assist the educator in the individualization of instruction by providing relevant information related to the management of this endeavor. The purpose of this research was to determine the current uses of computer-managed instruction (CMI) in selected elementary and secondary schools in comparison to the uses suggested in the professional literature. A survey instrument was used to collect additional data from selected schools presently using CMI. The study attempted to answer the following questions:

1. According to the literature related to computer technology, what are the functions of

computer-managed instruction? Also, what are characteristics of the identified functions?

2. Are characteristics and functions of computer-managed instruction, as reported in the computer technology literature, found in selected schools currently using the computer to manage instruction?

SIGNIFICANCE OF THE STUDY

This study forms a rationale for the implementation of computer-managed instruction (CMI) in the elementary and secondary schools. The data was obtained through a review of literature and by the application of a survey instrument with selected school districts currently utilizing computer-managed instruction. This study offers information regarding the elements of computer-managed instruction as reported in professional literature and utilized in schools. In addition to determining the present conditions regarding utilization, the study furnishes data that may have implications for future possibilities in the area. Specifically, the study:

1. Identifies functions and characteristics of functions common to CMI.
2. Determines the current use of CMI in elementary and secondary schools.

DEFINITION OF TERMS

SYSTEM The group of interacting components that are integrated and merged to perform the instructional management tasks ascribed to CMI. These components include computers, output and input devices, programs, and, various information banks.

FUNCTION One of the primary task performed by the computer to assist in the management of instruction. The CMI functions include record keeping, reporting, testing, prescriptions.

CHARACTERISTIC An attribute or feature of one of the CMI functions which further delineates the specific task being performed BY CMI.

COMPUTER-MANAGED INSTRUCTION. The computer performs various management functions, such as testing, record keeping, prescribing, and reporting.

PRESCRIPTION FUNCTION. Based on what is known about each student, the computer can provide information in the form of prescriptions or advice as to material or course selection for the completion of set objectives.

RECORD KEEPING FUNCTION. The computer can maintain data about student progress and performance; including information on learning styles, intellectual ability, age, and socioeconomic factors.

REPORTING FUNCTION The computer can generate reports on student performance and progress for use by students, parents and teachers.

TESTING FUNCTION The computer can construct, mark, and analyze tests.

MISCELLANEOUS CHARACTERISTICS Characteristics that do not directly relate to the CMI functions of record keeping, testing, reporting, and prescription, but are an integral part of CMI. The nature of these characteristics are mainly curricular or technological.

LIMITATIONS

1. The population was limited to selected school districts using computer-managed instruction (CMI).
2. The participant selection process examined the situation of particular sites over a definite period of time and will not be a permanent indication of the sample group's impressions.
3. The research findings reflected the perceptions of only the selected populations and care should be taken when applying the results to other school districts considering CMI.

4. The survey instrument examined the application of computer-managed instruction in elementary and secondary schools (Grades 1 through 12).
5. Other factors concerning specific school needs and philosophies could have interacted with perceptions regarding CMI and influenced the responses given.

ASSUMPTIONS

The following assumptions were made for this study:

1. A survey instrument, as a method of gathering data, is an appropriate device to determine the application of CMI functions and characteristics in selected schools.
2. The functions and characteristics of computer-managed instruction can be defined through literature related to computer technology.
3. The responses of the school district representatives present an accurate account of the respective CMI systems.

RESEARCH DESIGN

This study was divided into three sections: the developmental section, the data collection section and the reporting section.