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A COMPUTER-ASSISTED PRE-SERVICE PROGRAM IN READING

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Introduction

In 1975, the National Right-to-Read effort funded an experimental project at Northwestern University involving the application of computer facilities to the operation of a pre-service program for teacher preparation in reading. Utilizing a competency-based model (Houston and Howsam, 1972), the computer component of the program managed the student's entry into and progress through a series of on-line, interactive tutorials by assessing their initial behaviors, assigning lesson modules, guiding use of a bibliographical data base and monitoring progress.

The Management System

The instructional management component of the system was designed to accomplish six purposes: (1) student registration for the course of study, (2) storage of diagnostic information, (3) sequencing of computer-assisted tutorials for each student according to stored diagnostic information, (4) provision of student performance information to instructors, (5) provision of communication between instructors, students and programming staff, and (6) routing students through the diagnostic, instructional, information-retrieval, and communication components of the system. Each of these purposes is elaborated below.

Registration

Upon initial entry into the system, the students provided information similar to that collected at regular course registration. This information was used primarily to reserve for the student a space within the student records block for the storage of performance information and to effect communication between the student and the instructors using the computer.

Storage and Retrieval of Diagnostic Information

After initial registration, each student was involved in an assessment of his or her competencies in reading instruction. The assessment information, collected on-line, was converted into a set of prescriptions stated in terms of the lessons through which a student should be sequenced. This lesson

*MULTITUTOR is the name given to the language and organizational framework of the CAI environment at Northwestern. The name is derived from TUTOR, the language of the PLATO system, with which MULTITUTOR is upwardly compatible.

"chain" was followed each time the student used the system in an instructional mode. Diagnostic assessments accompanying each lesson allowed for transformations of the prescribed sequence as the student progressed. Performance information was stored within the system and could be easily reviewed by the course instructors for the planning of personal conferences or group lectures or for student evaluation.

Communications

One of the advantages of a computer-managed instructional system is that students may flexibly schedule their interaction with it. This advantage does not come without cost, however. Instructor-student communication becomes a problem unless the computer can be utilized as a communication device. The management system contained an "electronic blackboard" on which students and instructors could "write" messages to one another. The management system ensured that each message was received by the person to whom it was "addressed" as well as alerting the recipient that a message was waiting when he or she entered the system. Each message, after having been read, was erased and its space made available for other messages.

Routing

To the students, the system appeared to be a unified program when, in fact, it was comprised of a set of MULTITUTOR programs.* The appearance, maintained by the management component, was necessary to permit the students, most of whom had not encountered a computer before, to utilize the options afforded by the system without communicating with the machine in computer language.

The Lesson System

The lesson system consisted of simulation units on such standard topics in pre-service instruction as word attack (lesson ATTACK), emphases in beginning reading (lesson CODE), diagnosis of reading difficulties (lesson DIAG), use of the cloze procedure for assessment and instruction (lesson CLOZE) and others. The lessons were designed to take advantage of the interactive capabilities of the computer and to expand upon lecture and text presentations.

For example, in lesson DIAG, the students were required to choose tests for administration to a hypothetical student. After each choice, the pre-service students were required to score and evaluate the response data which were supplied by the computer, representing the test results on an individual child, so that the next step in the diagnostic procedure could be chosen. Thus they received feedback on the entire diagnostic process as it proceeded, much as one would in an actual testing situation.

In ATTACK, the students were introduced to basic word recognition strategies and asked to design step-by-step classroom procedures for strategy development. As each choice was made, a response to its appropriateness was communicated to the student before the next step of the procedure could be designed. In this way, the program attempted to communicate the importance of careful structuring of instructional presentation.

Each lesson was designed not only to present/review basic information but to involve the student in simulation of basic classroom activity before meeting the same sort of activity in the practice teaching situation. In conjunction with the computer interaction, practice modules provided for videotape and other audio-visual simulations as well as for on-site experiences with the designated topic.

The Reading Information Retrieval System

To say in 1977 that there has been an information "explosion" in the literature on reading seems trite. Pre-service and in-service teachers must expend enormous amounts of energy wading through information to find material appropriate to their needs. Indeed, that is at least part of the reasoning behind the creation and proliferation of commercially available educational data-bases such as ERIC. Three problems impede the systematic use of such systems in teacher education. First, they are prohibitively expensive for liberal use. Second, the mass of information, such as that made available through commercial systems, cannot be subjected to scrutiny. As a result, indexing is sometimes ambiguous to the inexperienced user. Third, such systems cannot be utilized prescriptively to serve students' instructional needs.

The information-retrieval component of the reading education system was created with an eye to solving or circumventing these problems. The cost to use the retrieval component averaged approximately \$1.00 per student contact hour, well below the cost of commercial systems. The number of descriptors with which students could retrieve information was purposefully kept below eighty. Students tailored their search strategies not by selecting a highly specific term, but rather by logically combining descriptors to reduce the number of possible sources of the information they sought. For example, if a student chose the descriptors "context clues," and "instructional techniques," articles on the use of the cloze procedure would be included in those generated. Each resource, prior to its inclusion in the data base, was reviewed by graduate students or faculty and carefully abstracted so that students using the retrieval component could evaluate the utility of the information while conducting their search.

The power of the retrieval component lay in its links with the instructional component. Should a student give evidence of poor performance in a lesson, the retrieval system could be automatically instructed to do a search for material relevant to the topic of the lesson. This feature enabled students to be exposed to other informational resources without depending either on their initiative or their ability to define the nature of their instructional problem. Furthermore, it enabled the background resources available to a lesson to be expanded without maintenance by the author of the lesson.

Conclusion

The pre-service instructional system was piloted with undergraduate and Master of Arts in Teaching students at Northwestern University.

Besides internal criteria provided by the system's series of mastery tests, students were asked to evaluate the utility of the system with respect to the demands of their practice teaching situations. Excluding those respondents who found any involvement with computers anxiety producing, 76% felt use of the computer lessons helped them operationalize the content of their pre-service course in the classroom. 62% reported that they were able to utilize the teaching structures and techniques directly in their practice teaching experience.

Since piloting of the project in 1976, the lesson simulations have been used in further pre-service preparation, in preparing tutors for an adult reading academy and for Right-to-Read in-service training. All of these uses emphasize the potential for computer use in the pre-service/in-service program.

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