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ABSTRACT

The role of the computer is examined in Lester Demonstration School, an optional school program offered by the Memphis City School System (an Apple Classroom of Tomorrow site). The student population is almost entirely black and generally considered to be socioeconomically disadvantaged and academically at-risk. Repeated observations were made of two classrooms (fifth grade and sixth grade) on a periodic basis over an 8-week period in the Spring of 1989. Three class sessions which were observed illustrate the different approaches to instruction at Lester using the computer. Each of the three teachers (a mathematics teacher, an English teacher, and a reading teacher) had a distinctive style of teaching, and their instructional methods, while all following the same general model, were molded to the combination of their unique teaching personalities and the material to be covered. All three methods appeared to be effective. The methods used by the math and reading teachers, for example, seemed to use the computer effectively for reducing the teacher-student ratio. By using the computer and applicable software as a teaching aid, they were able to provide learning experiences for all of the class while retaining the instructional benefits to be experienced when instructing smaller groups. Both of these teachers have developed models of teaching using accessible computer technology that seems to allow for more independent tutoring. (GL)

Integrating Computer Usage with the Teaching of School Subjects: A Study of a Naturalistic Computer-Intensive Environment

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INTRODUCTION

This paper will look what role the computer plays in the instructional procedures that have been observed at Lester Demonstration School during the spring of 1989. The Lester school is the scene for the Apple Classroom of Tomorrow (ACOT): an experimental teaching project involving one fifth and one sixth grade group of children. Lester Demonstration School is an optional school program offered by the Memphis City School System. The student population of about 900 students tend to be homogeneous: that is, they are almost all black and generally considered to be socioeconomically disadvantaged. The environmental characteristics of their neighborhood, coupled with the traditionally low achievement that has been documented among many of the children in this area over the years characterizes them as being "academically at-risk" (Ross et al., 1988).

The teaching situation in the ACOT classes at Lester is very unique: these children have been placed in a completely computer-saturated learning environment. In the classroom, each child has their own computer that sits on their desk and is available for them to use during the class period. At home, they have been loaned computers for the academic year to use in doing their homework and to learn on their own. Therefore both at home and in the classroom they have computers available to them. There are currently five ACOT schools across the nation, with a total of thirteen classes involved. The Lester project, however, is unique

in that it is the only one of these sites that is focusing attention on the economically disadvantaged, academically at-risk child.

METHODS

An ethnographic research method was employed in this study. The data that are reported in this paper were collected through participant observation; that is, the result of entering the classroom and observing first hand what is happening. Although there were repeated observations made on a periodic basis throughout an eight week period in the spring of 1989, only three of the class periods observed will be reported in this paper. These three classes were chosen for examination because they best represented the different approaches to instruction using the computer in the classroom which I have seen at Lester thus far.

INSTRUCTIONAL PROCEDURES

The instructional procedures that are used in the Lester classrooms come from the TIM model. TIM essentially outlines six steps to the instructional procedure that occur within the parameters of the classroom: orientation to the lesson, review of previous material, presentation of new material, probing by the instructor to assess the understanding of the learning objective by the class as a whole (this stage incorporates teaching adjustments when necessary to facilitate learning), individualized

practice of the learning objective by the student (i.e. "seatwork") and finally assessment of and feedback on the students' mastery of the learning objective. A seventh step to the instructional process, distributed practice (i.e. "homework") generally does not take place during the class period itself and therefore would not be something that an observer sitting in a classroom could see.

The teachers at Lester are following this TIM procedure as they instruct their students. Yet each seem to use the TIM guidelines and the availability of computers in the classroom in different ways, depending on the material to be taught and the learning objective for the lesson. Each lesson described below illustrates a particular instructional model which seems to incorporate the TIM guidelines, the subject matter to be taught and ready access to computer technology. The classes are English, math and reading.

The method used by the English teacher is the most linear, direct application of the TIM approach. The learning objective for the day involved the proper capitalization of words. This was not the first time that these children had seen capitalization of words, and the teacher used a combination of discussion and probing techniques to review material that the children had previously been exposed to. The teacher discussed the rules of capitalization in titles. She wrote some titles on the board and allowed the children to tell her which words ought to be

capitalized. She had enough examples to allow a number of the children to provide feedback, recognizing them when they raised their hand. The exact point where she branched out from review material to new material was not readily observable. There was some probing for students' understanding intertwined through the review and teaching of new material. The lesson flow was smooth, and the children seemed to understand the material.

When it was time for individual practice, there were three practice exercises given. The first and second exercises were traditional paper and pencil assignments found in the English textbook. In those two tasks, the students were asked to look at the underlined parts of some sentences and determine whether or not those words needed to be capitalized. When the two paper and pencil assignments were completed, the children brought their papers up to the front of the classroom where the teacher sat. The teacher graded the assignments immediately and handed the graded papers back to the students. Along with their graded assignments, the students were given a newly formatted data diskette. This they needed for the third assignment, the computer exercise.

The computer assignment also involved the topic of capitalization. The program they needed to access was stored on the hard disk of a host computer (a Mac II with a 20mg. hard disk) that controls their classroom computer network. The children already knew what file to access and how to get to it. The story

that they were to read was about Rosa Parks' history-making experience on a Birmingham bus in 1955. The children were to underline the words that should be capitalized. At the end of the story, there were several content and evaluative questions that the children were to answer. As is the case in most of the classes that I observed at Lester, when the children finished their individual assignments they were allowed to play games on the computers. This seems to act as an incentive for getting the assignments done.

The TIM model was also employed by the math teacher, but her format was different from the rather linear format of the English teacher. The math teacher conducted a quick orientation and then immediately separated the children into two groups. One group was assigned work using a math computer program. The other group went to sit at a table in the front of the room. There the teacher actively instructed the students.

The children at the table were studying the multiplication of three digit numbers in review. Later (in what was the presentation of marginally new material) they engaged in the multiplication of fractions. She instructed some, oftentimes using the blackboard to illustrate, and then asked questions of the students in the smaller group. Then in yet smaller groups (of about two or three), the children would go to the board and work problems that the teacher gave them. She would give them

direction and feedback if they needed it, but otherwise she would simply watch them as they worked out the math problems.

During that same time interval, the children in the computer group were working with a pink-panther sleuth cartoon character named "Fearless" who would progress through a room, opening doors behind which lurked numbers. After Fearless uncovered the numbers the program would switch to displaying a math problem in a conventional format on the CRT display. The problems involved two digit multiplication. The children were asked to provide the partial products, then prompted to add the partial products to arrive at the final answer. The pacing of the computer program required the children to arrive at the answer in a proper, step-by-step format. If the answer was correct, the CRT display would switch to a maze with blinking asteriks in it. The child was able guide the sleuth's dog through this maze until it ate an asterik. If the child was not correct, he or she would be prompted to work the problem again. At the end of the computer session, the children were given an assessment of how well they had done on the activity. Several children actually called across the class to the teacher, reporting that they had gotten 100% on the activity.

The reading teacher used an approach which could be thought of as a hybrid of the other two. This particular lesson differed from the other two in that the material to be covered was a new story and vocabulary words. There was no previous material to cover that day, therefore there was no review. After an

orientation and explanation of what was going to be done during the lesson, the children were directed to copy the new vocabulary words which were listed on the board. The reading teacher waited until they were finished with that, then she directed the students to come back to the reading table. Back at the table she began to go through some of the words that were on the board. The children, textbook glossaries in hand, would look up the new words. She would ask the children what the words meant, then she would ask for examples of sentences using the words. There were instances when a child who was called on did not know the meaning of the new vocabulary word. In such a case, the reading teacher would try to shape a correct response out of the child. If that did not work, she moved onto another child. She had a personable style that allowed her to do this in a smooth flowing manner that did not threaten or embarrass the child that didn't know the answer. The teacher made it a point to tie in the material to the common experiences of the children when possible. For instance, when reaching the word "exhibition," the teacher reminded the children that they had themselves set up an exhibition one Saturday at a local mall. Sometimes children echoed the answer to questions (almost as if they were in a chorus) rather than being called upon individually. I noticed that she used the flow of instructional interaction itself as a method of keeping control over noise: if a child was misbehaving, she'd simply make it a point to ask that particular child a question. The method cut misbehavior to a minimum.

After about ten minutes of whole group instruction, the class was divided. Once again, half of the children went onto the computers while the other half remained at the reading table. The students that went to the computers began putting their new vocabulary words, the definitions of the words, and a sentence using eac of the words onto a computer database.

The other half of the class remained at the reading tables where they began to go over a story with a different set of new vocabulary words. The teacher asked questions about what happened in the story, but she also asked some questions that would involve thinking and evaluation of the material. After working with this group for awhile, the group itself disbanded (returning to the computers to begin building their vocabulary database), although two children remained at the table. The teacher began to work with these two children independently. During that same time period, I watched as a third child gravitated back to the table to get a question answered, although that child did not stay back there long. With these latter two children, I noticed the teacher engaged in alot of shaping. Eventually these two also returned to their seats to begin work on the database.

FINDINGS AND CONCLUSIONS

Each of these teachers had a distinctive style of teaching and their instructional methods, while following the TIM procedures, were molded to the combination of their unique

teaching personalities and the material to be covered. All three methods appeared able to do the job. The methods used by the math and reading teachers, however, seemed to use the computer effectively for reducing the student/teacher ratio. Both the math and reading teachers had previously formed the groups on the basis of ability levels. They alternated days of instruction for the two goups of students; teaching each group every other day. Using the computer and applicable software as a teaching aid, they were able to provide learning experiences for all of the class while retaining the instructional benefits to be experienced when instructing smaller groups. In as far as individual tutoring is concerned, the "drill and practice" software used in the math class provided some personalized instruction. Both the math and reading teachers have developed models of teaching using accessible computer technology that seems to allow for more independent tutoring to happen naturally, the result of the regular flow of instruction in the classroom.