DOCUMENT RESUME

ED 047 923 RE 003 440

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TITLE An Automated Approach to Remedial Reading.
PUB DATE Feb 71
NOTE 7p.; Paper presented at the meeting of the American Educational Research Association, New York, N.Y., Feb. 4-7, 1971

EDRS PRICE EDRS Price MF-$0.65 HC-$3.29
DESCRIPTORS Audiovisual Instruction, Autoinstructional Aids, Computer Assisted Instruction, Disadvantaged Youth, *Grade 6, Individual Instruction, Reading Programs, *Reading Research, Reinforcers, *Remedial Reading, Retarded Readers, *Teaching Machines, *Tutorial Programs

ABSTRACT

The effectiveness of one-to-one tutorial elements was tested in an automated reading program possessing objectives similar to those in the Instructional Objectives Exchange (IOX) and a self-contained reward system. Twenty-one sixth-grade retarded readers from poverty backgrounds constituted three groups equated on reading proficiency. Groups were randomly assigned A, B, and C. Students followed a test-instruction-test progression through five units. Only instruction differed for the three groups. Group A received specific audiovisual reading tutoring; Groups B and C received trial-and-error training in reading and math, respectively. Group A showed substantial gains in untimed reading accuracy over the other groups, especially on standardized tests. Group B showed a significant increase in reading speed while maintaining accuracy; Group C showed little improvement. Future research is planned to determine whether the tutors can serve as active monitors of students' work in textbooks, workbooks, or other classroom instructional media. References are included. (Author/DH)

An Automated Approach to Remedial Reading[1]

The effectiveness of one-to-one tutorial elements was tested in an automated reading program possessing Instructional Objectives Exchange-type objectives and a self-contained reward system. Twenty-one sixth grade public school students from poverty backgrounds constituted three groups equated on reading proficiency. Groups were randomly assigned A, B, and C. Students followed a test-instruction-test progression through five units. Only instruction differed for the three groups. Group A received specific audio-visual reading tutoring; Groups B and C received trial-and-error training in reading and math respectively. Group A showed substantial gains in untimed reading accuracy over the other groups, especially on standardized tests. Group B showed a significant increase in reading speed while maintaining accuracy; Group C showed little improvement. Research will be continued on the parameters of the tutor's classroom application.

[1]This research was supported by the Department of Education, University of Virginia and by grant OEG 3-70-0007 (010) from the U.S. Office of Education.

AN AUTOMATED APPROACH TO REMEDIAL READING[1]

Review of Literature

A number of recent findings relate to the behavioral approach to reading. Popham (1970) stressed the utility of constructing academic programs from a behavioral objectives pool such as the Instructional Objectives Exchange (IOX).

Previously, Staats (1967) found that underachieving poverty children improved on well-defined reading behaviors administered by paraprofessionals in a one-to-one tutorial relationship.

Atkinson (1968a, 1968b) demonstrated that by using a computer, elements of a one-to-one tutorial relationship could be automatically administered. Gibson and Richards (1965) and Moore (1964) also achieved limited success in automating individualized instruction.

Phillips (1968) and Wolf, Giles, and Hall (1968) found extrinsic rewards highly applicable in motivating poverty children.

This research tested the effectiveness of one-to-one tutorial elements in an automated reading program possessing IOX-type objectives and self-contained reward system.

Objectives

The objectives of this research program were:

(A) to analyze the role of automated auditory and visual training procedures in increasing the accuracy of students' responding to reading comprehension questions relating to (1) recognizing the sequence of events in, (2) reproducing facts from, and (3) making interpretations from graded reading passages (the group having these training procedures will be referred to as Group A).

(B) to compare the effectiveness of the above procedure with a second, utilizing only immediate feedback as to answering accuracy as a training dimension (the group having this training procedure will be referred to as Group B).

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(C) to compare the progress of both above groups with that of a math control group receiving no reading training (the control group will be referred to as Group C).

(D) to assess differential improvement of all groups on standardized reading tests.

Methods

The project was conducted at a local public school during the 1969-70 year. Sixth grade retarded readers from poverty backgrounds were selected. On the basis of both standardized reading and constructed reading tests, three equal groups of seven students were formed. These groups were randomly assigned A, B, and C.

All testing and instruction, including tutoring, were presented by the electronic tutors. Students responded directly into the apparatus. Complete error and time measures were automatically recorded. A digital counter informed students of points earned (points were redeemable for candy, peanuts, etc.).

Operationally, five test-instruction-test units were administered. In each unit all students first were pretested on 32 readings accompanied by multiple choice questions representing the defined comprehension categories. After pre-testing, students received one of three types of instruction. Following the instruction phase a 32-frame post-test was administered.

The three instruction conditions follow:

Over several sessions students in Groups A and B viewed a total of 156 text-question frames. If a correct answer were made by an A student, he received several points and advanced to the next text-question frame. If an error were made, the equipment immediately administered specific tutoring.

For interpretive tutoring, key parts of the reading were underlined in red and a tape track administered parallel verbal help. For reproductive tutoring, those parts of the reading relating to the question were underlined in red, and for successive tutoring, the tape gave verbal help.

After tutoring, if the student answered correctly, he received one point while proceeding to the next text-question frame. If errors were committed after tutoring, the tutoring was repeated.

Group B's instruction differed in one important way. When errors were made, no audio-visual tutoring was given. Instead, the original text-question frame was re-presented until a correct answer was made.

For C students (controls) no reading passages were presented during instruction. A series of addition and subtraction problems were administered in the same manner as that found in the B condition.

Results

Immediate effects of the audio-visual tutoring over the trial-and-error treatment were demonstrated. Across all five programs A students averaged fewer after-tutoring errors than B students ($p < .01$).

Students receiving audio-visual tutoring also showed superior improvement across programs. Although grade levels rose from fourth to fifth and the length of reading selections increased by over 7%, Group A's accuracy rose from program block I-II to IV-V by 24%, which was higher ($p < .05$) than Group B's 6.5% rise. Eighty-three percent of Group A showed significant improvement; twenty-nine percent of Group B showed such improvement.

In addition to total comprehension results, Group A recorded significant I-II to IV-V gains in all three trained comprehension categories ($p < .025$). Group B recorded smaller and insignificant gains.

Periodic pre-program testing revealed Group A's superior improvement over the B - C groups' ($p < .05$). Group A's accuracy increased by 8%; B's decreased 9.5%; C's decreased 31%. This B - C difference, coupled with the program data indicating Group B's better than maintenance performance on increasingly difficult materials, indicated that the trial-and-error condition, although inferior to Condition A, was somewhat effective.

Besides accuracy measures, changes in time spent in reading passages were compared. Although A and B students averaged the same time reading new passages in program block I-II, by block IV-V, A students averaged 16% more time than B students ($p < .05$).

Pre-program tests yielded a similar pattern. On the pre-training test, A students

averaged 4.5% less time per question than B students, 9% less time than C students. On Pre-test V, however, A students averaged 38% more time per question than B students, 43% more time than C students.

The time-accuracy results of the standardized testing were similar to program results. Both Groups A and B showed significant improvement across the year in performance on timed standardized reading tests ($p < .05$). Group C did not. Group A averaged 5 months over gains made by control students; Group B averaged 7 months.

When, however, untimed standardized reading results were compared, Group A demonstrated significant improvement over Groups B - C ($p < .05$). Group A recorded a 17 month gain over that made by Group C and a 6 month gain over that made by Group B.

Although A students spent significantly more time during untimed testing than B or C students, this difference amounted to an average of only 25 seconds more per question.

Discussion

This project demonstrated that previously non-productive students could be maintained in academic tasks for an entire school year with the aid of extrinsic rewards averaging only $.07 daily per student.

Not only were students attentive to task, but they showed real academic improvements, especially if they received audio-visual tutoring. All standardized and intra-program measures indicated that by the end of the term A students, if untimed, showed improvements in reading accuracy far above the other students. Their 17 month gain over the control group on untimed standardized tests confirms the strength of audio-visual instruction.

Finally, virtually all A students recorded substantial gains in accuracy.

Although not showing the accuracy gains of A students, B students apparently did benefit from trial-and-error training. Their across-program reading speed increased with no corresponging decrease in accuracy. This ability to read more rapidly also was shown in the timed standardized results where B improvement was not only 7 months above provement, but 2 months above A improvement.

The tutors' effectiveness as dispensers of individualized help in the public school was demonstrated. The parameters of their application must be tested. Future research will determine whether the tutors can serve as active monitors of students' work in textbooks, workbooks, or other classroom instructional media.

The tutors' applicability to other academic content areas also deserves exploration.

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