

## REVIEW OF PROGRAMMED INSTRUCTION IN ENGLISH

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Teaching machines and programmed learning have been hailed as the greatest educational innovation of our time; they have also been called an educational disease (4). Research is slowly revealing the gray zone between the black and white positions of those who enthusiastically herald a new age in education and those who pessimistically denounce the evil effects inherent in a mechanized educational production line.

Of the two major varieties of programmed learning materials on the market today, one is known as the Skinner method. As a behavioral psychologist, B. F. Skinner has devoted his life to the study of learning in the laboratory, and his method of programming is the only one based on a fully developed theory of learning. A Skinner program is divided into minute steps with the learner being presented one tiny bit of information at a time. Each time the learner is presented a bit of content, he is given a problem or asked a question to which he must construct a response; that is, he must write out the word or phrase requested. He is then shown the correct response and compares it with his answer. The knowledge that his answer is correct serves as an immediate reinforcement of his learning. According to Skinner's theory, if a learner misses an item, the program, not the student, is in error; it has failed to present the material in small enough steps for the learner to master it. To insure that the learner will not construct a wrong response, prompts or hints are given to the correct answer. As the learner progresses through the program, the prompts are "vanished" or withdrawn.

The second of the two major types of programs available today is known as the Crowder method. According to Crowder, "... human learning takes place in a variety of ways ... that ... vary with the abilities and present knowledge of ... students, with the nature of the subject matter ... and with other sources of variability of which we are not even aware." (2) Because we do not know how students learn, the best we can do is to discover when they have not learned and to correct their failures. Crowder's program consists of a series of blocks of information that are considerably larger chunks of subject matter than included in a Skinner step. After reading this information, the student responds to a multiple-choice question testing his understanding. If he answers the question correctly, he is moved ahead to another question which double

checks his mastery of the material; and if he answers this correctly, he is moved ahead to the next block of information. On the other hand, if the student answers either of the questions incorrectly, he is "branched" to a part of the program never seen by the student who answered the question correctly. In this branch he is given instructions relating to the specific cause of his mistake and then given more problems to solve. If he is correct this time, he is moved ahead to the next block of information; if he is incorrect, he is requested to begin the sequence again. Crowder calls his system intrinsic programming because all the alternatives are built into the program. All possible errors must be anticipated and included within the multiple-choice items, and all possible reasons for these errors must be included in the instructional branches of the program.

Programmed materials may be presented to students in two different ways, in a textbook or in a machine. The textbook form is by far the most popular in schools at the present time. Although the machine prevents students from cheating, early research indicates that students learn as much when they peek ahead at the answers as when they do not. The price of a machine, which varies from the twenty dollar Min/Max distributed by Grolier to the \$1,250 Auto Tutor Mark II designed by Crowder, may be one reason for the popularity of the textbook format. Programmers estimate, however, that a class set of books for a full year course in some high school subjects would weigh over one ton while the equivalent course could be put on four hundred feet of film for use in a machine (9). The sheer bulk of programmed books may force schools to use machines.

Programmed materials and teaching machines are available now for schools who want them, and additional products are coming out monthly. Almost every major publishing company has announced some activity in this area. For example, Harcourt, Brace and World has commissioned the writing of fifty programmed textbooks, and Encyclopedia Britannica plans to publish programmed material for at least part of every course offered in the high school curriculum. Grolier, the publisher of the Book of Knowledge encyclopedia, sold 150,000 of their Min/Max teaching machines (\$20-\$25 each) and 400,000 programs (\$7.50-\$15.00 each) in door to door sales to parents. Univox has led the way with a unique marketing device; it gives away the machine if the parent will purchase one of its \$14.95 programs in grammar or spelling. Univox believes that it will realize its profit in the continued sales of new programs to machine owners. Surveys reveal that about 2,000 schools used programmed instruction during the 1961-62 school year and about 6,000 plan to use it during 1962-63 (9).

As one would expect, the earliest application of programmed instruction to English was in the area of vocabulary, usage, and grammar. Diederich (3), research associate in the Educational Testing Service, describes the plan evolved by sixty-three English teachers on Ford Foundation fellowships who attended a 1959 summer workshop at Rutgers University. In what is popularly known as the Rutgers Plan, students spend two days a week of their English period in small discussion sections with a teacher, two days a week in a "free reading" room, and one day a week with programmed materials on English "fundamentals." On this day the student reports to what Diederich calls the "Skinner Room" where a "technician" is in charge. The student gets no credit for the score on his work with the programmed material, but he is later tested by the technician on the same material. If more than ten per cent of the students miss an item, the technician discusses the item with the class. The teacher has each half of the class two days a week in discussion groups. His fifth day is free for conferences with individual students.

During the following summer, six experienced teachers in the Denver Public Schools developed a programmed textbook in the mechanics of English for their school system. The project is described by Reed (15), supervising teacher of English in Denver. In five weeks of work these teachers had prepared 2800 Skinner-type items covering sentence structure, parts of speech, capitalization, and punctuation. They also began work in the areas of spelling, vocabulary, and literary terminology. Reed sees three major advantages in the use of this type of programmed material. First, pupils will be able to move ahead at individual rates. Bright pupils will not be held back, nor will slow pupils be pushed ahead of their achievement level. Second, because a pupil must construct a response every few seconds, he must constantly be tuned-in to the instructional program. Finally, the student's answer is either corrected or reinforced immediately. A teacher working with twenty to thirty pupils could never give such constant and immediate evaluation of progress to the learner.

In the area of English, the teaching of skills has had far more attention from programmers than the teaching of literature. Of all the available programs in grammar and usage, English 2600 (1), a Skinner-type textbook, has received the most attention. Fine (4) quotes such teacher testimonials to the book as "I found that by using English 2600 I was able to devote more time in the classroom to literature and composition. I let the students use them on a self help basis. They got along without me . . . ." Fine also reports a study carried out in Manhasset Junior High School, Long Island, New York, in which eighth graders completed

English 2600 in 12 1/2 hours "with a comprehension no ordinary textbook could match" in a full year's course. Sister Hortense (7) reports that her students did well after using English 2600, and that student opinion of the program was highly favorable. All of these studies, however, were conducted very informally.

Gladys Nunn (12) using English 2600 with a senior class in Muskogee, Oklahoma, also studied a control class which she taught in the usual way. She reports that in general her control class did better than the matched class using English 2600. She concluded that the steps were so easy in the program that students could construct their response without "thinking."

The Denver Public Schools carried out a much larger and better controlled study of the text (5). No significant difference was found between the achievement of students who had used English 2600 and those who had not. The program was more successful with high achievers than with low. The Denver report concludes that English 2600 does not represent a superior method of teaching grammar and usage and should not be adopted for use in the city schools except as a supplementary text to provide variety in teaching approaches.

Psychologists as well as teachers of English have studied English 2600. Susan Markle (11) entitled her review of the text "Confusion Worse Confounded." Dr. Markle documents at some length the "confusions and foggy notions" that are the subject matter of this program. She warns that if students complete this text with only "partial acquisitions," we should not blame programmed instruction but only the poor construction of this particular program. In spite of these adverse reactions, however, Harcourt, Brace and World, encouraged by the sales of English 2600, released this fall its sequel, English 3200, designed for the upper years of high school.

Although English 2600 may be the most popular program teaching English skills, it certainly is not the only one. Doubleday is publishing a series of English language programs under Crowder's supervision. This series is currently being tried out in eighty school systems throughout the United States. Klaw (9) reports a program in spelling studied by the U. S. Office of Education in which a sixth grade group using the program scored higher than its control group after spending only one third the amount of class time on spelling. Wilson and Robeck (17) comment that programs teaching spelling should use Skinner-type constructed responses since spelling is a skill that always requires a person to write rather than to select among alternate responses. Samples of four Skinner-type

spelling programs appear in the May-June, 1961, issue of Audio-Visual Communication Review. Two of these programs are published by Grolier, another is by I. K. Hoose of Kent State University, and the fourth is by David Stone of Utah State University. Grolier also has published a program in punctuation skills.

Reading is another active field in programming. The same issue of the Audio-Visual Communication Review also has samples of a vocabulary program by Susan Meyer of Harvard. The most ambitious reading program is being prepared by the Center for Programed Instruction, a non-profit organization financed by the Carnegie Corporation. In this program (10), designed for junior high school use, one section teaches recognition of the root of a word, a second section deals with word analysis, and the third emphasizes critical reading (the slanting of facts through the use of loaded words, for example). All three sections are Skinner-type programs taught in textbooks rather than machines. Last school year the programs were tested in a South Orange, New Jersey, junior high school and in forty-eight New York City schools. Although the results have not yet been published, Superintendent Joseph Loreton reports that the results were "so successful that we're scared!" (7).

Speech teachers, too, it seems are interested in programmed instruction. L. S. Harms (6) compares programmed learning to a speech situation in which the speaker gets an immediate feedback from his audience. He sees programs relieving teachers of teaching the material "they grow weary of explaining." He suggests that such speech textbook content as delineation of speech topics, outlining, mechanics of television, debate techniques, operation of vocal mechanism, and stage vocabulary as well as explanations of speech assignments be programmed.

Griffin and Knudson (5) recently conducted a survey of the major programming companies to discover what programs are currently being written in high school English. Although their list is not complete, it is interesting. They report four programs being written in grammar, three in vocabulary, two in reading, and one each in remedial English, modern usage, remedial reading, non-oral reading, reading development, critical reading, library usage, structural linguistics, and word building.

The teaching of literature through programmed instruction has not been regarded as impossible. Here, of course, we are dealing in a less structured field than we were in skills and the programming difficulties mount. The major effort so far has been to teach the terminology of literary criticism. Rothwell (16) suggests that, since both the new criticism

and programmed learning share a common commitment to an empirical method, they are admirably suited to each other. He concludes that from this "merger between programmer and critic may come at last a coherent undergraduate program in English carefully sequenced from high school through the junior and senior years in college."

Two programs designed to teach poetry are currently on the market, one written under Crowder's supervision and the other based on Skinner's method. The former, by John Clark Pratt, is entitled The Meaning of Modern Poetry (14), and the latter, Poetry 230, is available only in an experimental edition from Harcourt, Brace and World. Both programs are in textbook form and no machine is necessary for their use.

It is extremely difficult by simply reading programs to tell a good one from an inferior one. The Carnegie Corporation, fearing that the flooding of the market with inferior materials will discredit the whole idea of programmed instruction before it can prove itself, has given a sizeable grant to the Educational Testing Service to set up standards that may be used in judging programs.

We need evidence as to which type of program is the most efficient-- a Skinner or a Crowder type or a totally different variety. This question is complicated by many factors. One type may be better in teaching certain areas of the curriculum while another type will be more effective in other areas. One type may teach a skill in much less time, but retention may be much longer for another type. One type may be a great deal more expensive than others. Not only is it probable that different areas of knowledge will lend themselves to different types of programs, but also, because of human variability, one student may learn better from one type of program while another may profit more from a different type. A student with one pattern of cognitive abilities may learn in an entirely different way from a student with a different pattern. Experiments with programmed materials should help us to match individual students with types of instruction.

Although at the present time there are many claims for the superiority of programmed materials and machine teaching over conventional textbooks and teacher-taught courses, there is little evidence on which to support or to reject these claims. The program advocates assert that their product is a boon for the bright student who can move ahead at his own rate and even a bigger blessing for the slow learner who, although he is behind his classmates, need never again feel lost. The claim is made that this slower student can learn as much from a program as the

brighter student if he is given the time to complete it. Much research is needed in all areas of this exciting new field.

A dean of English teachers in America, Robert C. Pooley (13), imaginatively describes the teaching of English in the high school of 1975. In this school without "live" teachers, everybody learns everything, but it takes some much longer than others. The principal of the school points out that, although it is the most efficient school in history, there is a missing element which he calls "human warmth." He explains that in the 1960's teachers facing large classes armed themselves with grammar books, workbooks, true-false tests, and literature facts and became machine teachers. Thus they placed themselves in competition with machines and were replaced. Pooley concludes, "The world will never abandon inspired teachers. Let the machine replace the others; they will never be missed."

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