PROGRAMED INSTRUCTION:
ITS PRINCIPLES AND APPLICATIONS**

I. Background Research and Principles


The papers in this volume are divided among theoretical discussions by some of the leading thinkers in the field, the actual processes involved in programing and the necessary characteristics of programers, and the current research now being conducted by industrial and military groups. The editor's introductory paper pinpoints the differences between the approach used by B. F. Skinner and that recommended by Norman A. Crowder. It focuses the interest of the volume on generating discussion of problem areas currently facing the field.


This book contains a most comprehensive group of essays and serves as an excellent one-volume account of significant work in this field. Several theoretical and background papers by pioneers in programed instruction are included with representative papers by S. L. Pressey and B. F. Skinner. Essays are presented which describe the use of programed learning in college foreign language and psychology courses, as well as in high school and primary school vocabulary and arithmetic learning. Problems relating to the design of the machines as well as other technical questions are discussed. The editors' comments are illuminating for those seeking a broad overview of the field.


In clear and concise terms the promise and problems of teaching by machine are discussed. The history and contemporary types of ma-

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achines are specified. The characteristics and needs of the learner are discussed in relation to the program. Especially informative sections deal with the principles and logic of programing. A concluding statement focuses on the “implications for education” and whether programmed instruction is “fad or fixture.”

2. Educational Experiences


The author has experimented with programmed learning in his own logic classes. He is interested in dispelling the negative emotional reaction resulting from the use of the term “machine.” Rather than serving as a substitute for the teacher, the machine serves as another tool for the skilled instructor. The positive results of more effective learning for the educational system include: decrease in time necessary to master course material; increase in actual material learned; increase in the numbers of students who experience learning as a successful activity. In a time of expanding school population and costs, machines can decrease costs, cut teacher work loads, and provide greater stimulation to each student through more individual instruction.


An important contemporary psychologist who has been most active in research with programmed instruction discusses the history and current focus of his work. In clear style he outlines the basic principles underlying “teaching machines.” Like a private tutor, the machine stimulates, challenges, and allows the student to evaluate his own progress. The underlying principles include the student’s composition of his own responses, his passing through required stages of learning, and the use of reinforcement techniques to affect his motivation.


This is one paper in a pertinent symposium, “Can the Laws of Learning Be Applied in the Classroom?” The current research with teaching machines opens up areas of collaboration between psychologists and educational psychologists. This collaboration directed toward the implementation of automated teaching devices would change the duties of the teacher. “Prominent among these . . . would be the building up of interests and goals in the student which, in turn, would provide for events that would serve both as secondary reinforcers and incentive motivators. It is in this latter regard that the classroom is so deficient today.”
3. Industrial Applications


This article is directed toward industrial use of programmed instruction. After discussion of the major characteristics associated with all machines, the authors focus on the different types of hardware. "General purpose teaching machines" are distinguished from "special purpose machines" which teach special skills such as "audio-manipulative co-ordination tasks" and "tasks where speed and motor accuracy are essential, and tasks where the eventual work environment must be simulated." "...programmed instruction offers a technique of increased effectiveness, which will at the same time allow training costs to be rationalized effectively, evaluated accurately, and amortized in a sensible manner."


This new tool, though still in its early stages of development, should be of major interest to training directors. The term "teaching machine," with all it connotes, should be replaced by "programed instruction." As with all training in industry, it should be judged by its ability to change behavior. Programed learning is effective to the extent that it increases performance. The actual program fed into the device is central in achieving this goal. As such, industry should concentrate on the "blade" rather than the "razor."


Reports on a meeting attended by both social scientists and industrial researchers concerned with the application of programmed learning. Representatives of industry discuss their companies' research experience. Social scientists answer questions in a group discussion seminar. Excerpts from actual programs give the reader a feeling for learning techniques currently being experimented with.

³ "This article, as well as others giving many details of program construction and use in schools, business and industry, will appear shortly in *Programmed Instruction: Uses in Industry and the Armed Forces*. Edited by the Center for Programmed Instruction, to be published Spring, 1962 by John Wiley & Sons."

Two researchers from International Business Machines report on an experimental study comparing the effects of teaching with programmed versus conventional material. The results of the study indicate a "reduction in training time and the improvement in learning achievement possible through the use of PI in industrial training." Thus it is suggested that a "reduction in the number of days that employees need to spend at central company training centers" is possible and that "a greater decentralization of training" may be instituted. "Student reaction to programmed instruction as measured by a questionnaire was found to be favorable."

Lyssaght, Jerome P. "Programmed learning and teaching machines in industrial training." *Journal of the American Society of Training Directors* (Gordon M. Bliss, Executive Director, 2020 University Ave., Madison 5, Wis.), February, 1961 and June, 1961. pp. 8-13 and 13-20 respectively. $1.00 each.

Experiments at the Eastman Kodak Company are reported on. These were conducted in order to "study cost, effectiveness, and student reaction to the new approach." In addition successful efforts were directed toward the actual training of programmers. Although the results are preliminary, programming has been initiated in: logarithms, slide rule, basic photography, theory of sensitivity, industrial relations standard procedures, supervisory training, materials handling, and economics.


This special issue is directed toward supplementing the expanding literature in the field. The articles cover several areas of interest. These range from a "nontechnical account of what can be done with automated teaching" to "relatively sophisticated psychological ideas germane to the learning process." Other papers discuss "the total effort so far in the United States at all educational levels," "an experiment in which a computer is used to impart a dynamic quality to the student's experience in programmed learning," and "a method of automating the feed-back process through a device which provides the instructor with immediate responses from individual students in a conventional classroom."

Notes: A useful longer bibliography compiled by Edward B. Fry, Glenn L. Bryan, and Joseph W. Rigneys will be found in Volume 8 (1960), No. 2 of the *AF Communications Review* published by the Department of Audiovisual Instruction, National Education Association (1201 16th St., N.W., Washington 6). 80 pp. $1.50.