

teristics of teachers, this has not been my intention. A pioneer investigation has to be concerned with methodology. Arthur S. Adams, President of the American Council on Education, in the foreword to the book, cautions the reader that "the volume will be disappointing to those who seek a quick, superficial answer to one of the most difficult and complicated questions in education." On the other hand, the sober educator, particularly if he is concerned with the education and selection of teachers, will find much in this volume to weigh and ponder. Not only have useful research tools been fashioned; the framework of the building to be erected with those tools has been constructed.

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The Educative Process

Herbert A. Thelen, EDUCATION AND THE HUMAN QUEST (New York: Harper and Brothers, 1960) 224 p. \$4.75.

This book is a hard one to classify. It is a summons to intelligent people to be intelligent. It is a buck-me-up evangel to those teachers who may have been intimidated by admirals and history professors. It is a manual on educational policy fit for use by school boards and lay citizens committees.

It is all of these things but it is only in the first category that this book is appropriately reviewed here. Thelen has an urgent message, and all of us need to be reminded, from time to time, that progressive education really works when it is carried on by thoughtful and imaginative people.

Thelen has moved, in his career, from the natural sciences to demonstration school teaching to the behavioral sciences. In this progression, he has developed a keen sense of how the human being learns. In this book, he has tried to draw together all our knowledge of the three basic ingredients of the educative process—man, knowledge, society—and then to show, by way of four models, how boys and girls carry on the educational quest: personal inquiry, group investigation, reflective action, and skill development.

There are some who would say that the behavioral scientists, especially those in the

vicinity of education, have become enraptured of group process as the grand imperium of all pedagogy. While Thelen is not so starry-eyed as most of the others, the coloration of his analysis of education is unquestionably sociological.

There is much to ponder here, however, and Thelen's style is not only witty but disturbingly penetrating when it comes to some of the troublesome failures of modern education.

—V.C.M.

Teaching Machines

A. A. Lumsdaine and Robert Glaser (editors), TEACHING MACHINES AND PROGRAMMED LEARNING: A SOURCE BOOK (Washington, D. C.: Department of Audio-Visual Instruction, National Education Association, 1960) xii + 724 p. \$7.50.

Part III is concerned with the contributions of B. F. Skinner and those who have been associated with him or have followed his ideas. Skinner has already emerged as the glamor figure of the teaching machine movement, in large part because of his excellence as a psychologist and his apparently unlimited capacity for work. To this must be added, however, his personal dynamism and his talent for attracting disciples. In this section are found two of Skinner's articles which are well on their way to becoming pedagogical classics.

Part IV presents a dozen articles selected from contributions to military and industrial research. These articles are noteworthy for their technical competence. The two general discussions in this section, one by Finn and the other by Ramo should spark many an argument in seminar rooms and coffee lounges.

The book concludes with fourteen papers prepared within the past three or four years. About half of these have not been published before. By and large, they represent refinements and extensions of the original work of Pressey and Skinner.

No event in American education in a generation has caught the fancy of people as has the teaching machine. Articles are now appearing in the public press informing the general citizenry of the new technological

revolution which will transform American education. Resistance to the machines is already developing, apparently some of it based on fear of technological unemployment and some of it on reasonable doubts about the psychological theories on which the machines are based.

Until recently there has been no central source to which a reader could go for information on mechanical innovations in teaching. General articles and research reports are scattered through the literature and require much searching out. We are greatly in the debt of Messrs. Lumsdaine and Glaser, together with the NEA Department of Audio-Visual Instruction, for providing a compact authoritative source book on teaching machines. The selection of representative articles is excellent and the abstracts of research articles in the appendix increase the value of the volume manyfold.

The book is divided into five parts. Part I is an introduction containing articles of general interest by the two editors. Part II deals with the contributions of S. L. Pressey, who is recognized as the "father" of the instructional machine. Four of the eight articles in this section are reprints of Pressey's own publications. These range from his 1926 paper on a device for testing, scoring, and teaching through his appraisal of machines for automatic scoring of tests and self-instruction published in 1950.

It is inevitable that anything written in a field as new and volatile as this one will be dated very quickly. In one sense this volume was out of date before the copy reached the printer. Nevertheless, this a major contribution and it is certain to be a standard reference source for some time to come.

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An Engagement in Inquiry

Jerome S. Bruner, *THE PROCESS OF EDUCATION* (Cambridge, Massachusetts: Harvard University Press, 1960) 97 p. \$2.75.

This is the "chairman's report" of a conference held by ten psychologists, six mathematicians, ten natural scientists, three classicists, and five "educators," of which one is

an administrator, one is an evaluator, and two are "cinematographers" interested in audio-visual developments. The author, Professor Bruner, is a distinguished psychologist, well-known and often cited for his research on social-emotional and personality factors in perception. His report was stimulated by the conference's recognition that curricula recently set up by physicists, biologists, and mathematicians have been outstandingly successful; and the report identifies and explicates the principles of learning believed to be responsible for the success.

The principles are explained in relation to four topics or themes. The central concept is "structure," which means internalized relationships, understandings, and meanings—as distinguished from conditioned learnings and simple recall of facts and techniques. The second concept is readiness, which is partly dependent on developmental stage but which capitalizes on the fact that at any age students (properly taught) can obtain at least an "intuitive" grasp of almost any principle. The third topic is the nature of intuition which is clarified by distinguishing between speculative thinking on the one hand and step-wise analysis on the other. The fourth topic is "the desire to learn and how it can be stimulated," and the author believes that interest in the material itself is the best stimulus to learning.

Having stated these themes, Bruner then uses the remaining seventy-six pages to explicate them further as principles of meaningful learning, and also to "conjecture" about how best to aid the teacher in the task of instruction. The explication is a concise, authoritative, and understandable summary, and all of us concerned with education should give heed to it. It reinforces the conception of education as an engagement in inquiry—not as a slogan but as a position to be implemented by seeking answers to questions related to the four major topics.

The suggestions of the teacher's role in developing activities and curricula consonant with the image of the child as discoverer, speculator, and internalizer are meager. Clearly there should be some relationship between an enlightened model of a child having meaningful experience and the practical policies a teacher or curriculum builder can follow to set conditions likely to maxi-