An Introduction to Programmed Education:
Teaching Machines and Programmed Instruction

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Philippine Studies vol. 17, no. 3 (1969): 627–630

He documents quite well the religious intent of the Georgics. As a believer attuned to the wonders of God's working in history, it is not surprising that Fr. Demetrio brings to his task a richer and deeper insight into nature and into man's efforts to come to terms with it.

This reviewer was especially happy to see the extent to which the work of Mircia Eliade has shaped the author's thinking. In reading Fr. Demetrio's work against the background of Eliade's writings, one can not help but recall Eliade's statement that, "every hierophany is an abortive attempt to reveal the mystery of the coming together of God and man. The whole religious life of mankind expressed in the dialect of hierophanies is simply a waiting for Christ." Though the religious character of the Georgics may seem far removed from the mystery of the Incarnation, the Georgics are nevertheless a significant document in the history of man's religious quest.

The introduction and the first two chapters of the book deserve special commendation. The author has summarized a great wealth of material in a very brief space. Perhaps, it is unfair in such a presentation to expect a full explanation of statements made. At any rate this reviewer would have liked a fuller explanation of such a statement as, "it is now acknowledged that the structure and function of the archtypes (Jung's) are in striking agreement with the structure and function of the hierophanies" (of Eliade) p. 19. Again a brief discussion of the whole question of ultimacy so prominent in the writings of Tillich might have helped focus on the deep spiritual need of man expressed so often in the religious symbol.

The criticisms are, however, minor. The author is both a classicist and a student of folklore. Since completing this work, he has been devoting himself to the study of folklore in Northern Mindanao. We are quite confident that his efforts to trace the religious traditions of his own people will be marked by the same scholarly erudition and deep sympathy displayed in *Symbols in Comparative Religion and the Georgics.*

JOHN F. DOHERTY

AN INTRODUCTION TO PROGRAMMED EDUCATION

TEACHING MACHINES AND PROGRAMMED INSTRUCTION: An Introduction. By Edward Fry. New York: McGraw-Hill Book Company, Inc., 1963. 244 pp.

This book is not entirely new, but the ideas expressed here are still of current importance in all phases of education. It describes

various teaching machines and programming techniques which have attracted a considerable amount of interest in the past few years. It starts with descriptions of programming techniques and the teaching machines developed and used by the pioneers in this field. It discusses the types of programming and views of Pressey, Holland, Skinner, and Crowder. In the second part of the book, Fry gives a detailed description of how to write, evaluate, and utilize programs. In the appendix, it shows examples of programs constructed by Fry himself, the Teaching Machines Incorporated, James Holland, B.F. Skinner, and Norman Crowder.

Fry talks about two basic types of programs, which are classified depending on the kind of response demanded of the student. The constructed-response type of program requires the learner to write an answer to a question put before him by the programmer. The question is of the open-ended kind, so that the student has to frame his own answer. The second type, the multiple choice type of program requires the student to select one of a number of alternative answers to a question. The learning of the former type clearly depends more on the ability of the student to recall data, the latter, on the ability to recognize it.

The constructed-response program is chiefly associated with the work of B.F. Skinner and his associates, including James Holland. Its identifying features are the following: (1) use of small bits of units (frames) averaging two sentences in length; (2) forced student responses, usually in the form of short written responses following each item or frame; (3) the use of small, easily grasped steps in the presentation of the information (shaping), and (4) the use, generally, of linear arrangement; that is, the material is arranged in a single ordered sequence and every student must proceed from the first to the last item, hence, the name linear sequence programming.

Skinner and his associates tend to program in the constructed-response manner, because it makes possible selective rewarding or reinforcement in small easy steps.   And also, because of their belief in the fact that recall or reconstruction of data is more effective in inducing learning than just simple recognition.

The multiple-choice program offers the student alternative answers to the question at the end of the frame. Usually it is such that the program is arranged in branches. The actual branch taken by the student depends on his answer to that particular question. Because of this property this programming sequence is also referred to as "intrinsic" programming. An example of this kind, is the so-called 'scrambled book system" developed by Crowder.

A typical item in the multiple-choice program consists of two short paragraphs containing the text, followed by a multiple choice

question. An apparent advantage of this kind of program over the constructed-response type is its capacity of being able to explain why a response is correct or incorrect. Also, because the program has a predetermined pattern set for a particular response, the cause of most errors may be determined, making possible the insertion of remedial branches at any point of the program. As opposed to Skinner's view, Crowder believes that students will benefit from the errors they make.

Programs are usually presented in book forms or in forms which make use of a wide range of devices popularly known as teaching machines. This book describes and illustrates some of the machines being used today.

Fry says that there are 5 basic principles that apply in the construction of a program. They form the solid core of the programmer's course of action, and they need to be understood by anyone contemplating the preparation, evaluation, or the use of programmed materials. The principles are:

1. Principle of small steps (easy sequence of steps)

2. Principle of active responding (student makes a definite response)

3. Principle of immediate confirmation (student learns immediately if he is right or wrong)

4. Principle of self pacing (student chooses speed of progress)

5. Principle of student testing (the program is revised on the basis of student performance)

Although most programmers agree on the principles cited above, there have been wide variations on their application in specific programs. Thus, Fry discusses the different techniques used by Skinner and Holland, the RULEG system of Evans, Glaser and Homme, and the multiple-choice programming of Norman Crowder and Keislar.

For the rest of the chapters of the book, the author discusses theoretical and practical researches, which are relevant in the construction of programs. He also includes a discussion relevant to costs, requirement of teachers, place of programs in the entire educational program, lesson length, and amount of repetition required. In the last chapter of the book Fry, gives out a series of factors which have to be considered when judging program quality.

Since the field of programmed instruction and teaching machines seem to offer a great promise as aids in classroom instruction, this book will make good reading for individuals in charge of selecting and evaluating instructional materials for schools. For those interested

in writing programs themselves, the rules, techniques, and examples will prove profitable. This book may also be used as reference for courses in teaching methods, learning and audio-visual education. The educated layman who wishes to acquire an intelligent understanding of programming techniques in teaching, may find this book of interest as welL

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THE SPIRIT OF THE SCRIPTURES

THE SOURCE OF REVELATION. By Henri de Lubac. New York: Herder and Herder, 1968. xii, 244 pp.

This book is the translation of a work published in French under the accurate title: *Scripture in Tradition.* It contains three chapters excerpted from other works by de Lubac. All three chapters "share a single focus: the spiritual understanding of the Scriptures, as it existed during the Christian centuries." The whole book may be considered to be a plea for exegetes and theologians to take seriously "the key idea which since apostolic times has dominated the doctrine of the spiritual understanding of the Scriptures, as elaborated through the ages", i.e., the New Testament is hidden in the Old; the Old Testament is disclosed in the New.

Paul, Origen, Tertullian, Ambrose, Augustine, Gregory the Great, John Chrysostom, Bernard, Bonaventure, John of the Cross, Newman, M. J. Lagrange are a few of the links in the chain of witnesses which extends across the centuries. They witness to the fact of a spiritual meaning of Scripture. They witness to the fact that it is not sufficient to view the Old Testament as a unique, inspired document which instructs us about the past of the people of God, about their faith, their expectations, about the preparations made by God through them for his Christ. This is, of course, correct, and must be presupposed, but it is incomplete. This viewpoint must be complemented by an attitude that seeks in the Bible "not a dead word, imprisoned in the past, but a living word, immediately addressed to the man of today... a word which affects him, since it is for him that it was uttered and remains uttered".

There is a need for spiritual understanding. We must grasp the letter in a new spirit, i.e. in the spirit of the New Testament, the first fruit of the Spirit of Jesus. We must seek the spiritual meaning. "It is the meaning taught by the Spirit of Truth, who is the spirit of Christ. It is the meaning which is related to Christ, to the Lord: now 'the Lord is the Spirit,' precisely the Spirit of the Scriptures."