# Systematic Instruction

**MARJORIE PRENTICE***

MULTIPLE pressures to plan, to economize, to be accountable, to apply research results, to be all things to all people, are no longer new concerns to the practicing educator. What is new, however, is the realization that at last there are the technological, pedagogical, and conceptual tools and techniques to help meet defined needs. Lest this sound too optimistic to match reality, let it also be acknowledged that there can be a long distance from having access to the tools and techniques to having the expertise to utilize them in optimum balance to meet the goal.

Many problems block speedy realization of the potential of systematically designed instruction. Lack of consensus is one such problem. There is no general agreement as to what is meant by the term systematic instruction, at what operational levels it applies, what elements are critical to the concept, and what relationships exist between the elements. On the positive side, there is evidence that a systematic approach has solved problems in business, industry, and government. The potential is there for education. A systematic approach is neither new nor miraculous. What is it?

It is rooted in such diversified fields as logic, philosophy, communication theory, psychology, and others. It is a pragmatic application of the scientific method; it is a synthesis of successful methodologies in problem solving, planning, and development, used by many people in many fields over a long period of time. Briefly, the systems approach is common sense by design.[1]

For the purposes of this report, three points of view will be considered. Each view will be consistent with the concept of design as rational, orderly thought, and a system will be defined as a composite of related interacting components which share a common purpose or function. Thus, systematic instruction is considered: (a) as a whole program, or block of curricular intent, in which instructional aims, the procedures for achievement, and the means of assessment have all been precisely defined; (b) as an individual packet of performance-based tasks assessed by measurement of discrepancy between achievement and a predetermined standard; and (c) as instructional activities dependent on a specific hardware support system.

Common elements from each viewpoint lead to three conclusions: (a) instruction approached with systematic design principles will bring about a predetermined and measurable outcome; (b) evidence as to effec-

[1] Bela H. Banathy. *Instructional Systems.* Belmont, California: Fearon Publishers, Inc., 1968. p. 16.

* *Marjorie Prentice, Assistant Professor of Education, Drake University, Des Moines, Iowa*

tiveness is continually available; and (c) the recycling of such evidence permits modification and redesign.

## Program Level

As stated earlier, systematically designed instructional programs are not new to the American educator. By 1968 the U.S. Office of Education had already contracted with the Systems Development Corporation to study ongoing public school programs in Alabama, Florida, Michigan, and Utah. Colleges and universities across the country were involved in a variety of systematic research and development projects.

One of the early well-known projects was the effort at Oak Leaf School with personnel from the University of Pittsburgh. Their Individually Prescribed Instruction (IPI) project includes instructional segments which are designed as a function of both broad educational goals and individual student capabilities. Project PLAN (Program for Learning According to Needs) is a continuing example of a West Coast pioneering effort. As originally developed, the project includes a bank of objectives from which students select an appropriate assortment. Computerized monitoring of pupil progress is a built-in component of this system.

A third publicized application of systematic instruction is that developed by the Behavioral Research Laboratory (BRL) in connection with Project READ. Each of these programs has benefited from extensive funding, has achieved national recognition, and has undergone continuing analysis, assessment, and modification.

To be of value to individual students, however, neither national visibility nor excessive funding is necessary. Individual districts are designing many combinations of multimedia resources and audio-video technologies into local instructional systems.[2] The list of successful programs is growing rapidly. The most significant point, however, is not the length of the list, but the agreement by increasing numbers of educators that by some means they must become more responsive to the needs of their students and the aspirations of their community within the constraints of diminishing resources.

There also seems to be general agreement as to three major system requirements: (a) identification of priorities based on goals and related objectives (*ends*); (b) development of alternative ways to maximize student achievement (*means*); and (c) evaluation of results on the basis of a cost/effectiveness balance.

## Performance Level

As most systematically designed programs include modules or packets in some form, it may seem like an arbitrary distinction to separate the program from the performance unit. If one returns to the *ends/means* distinction, however, this separation is essential. Program goals specify the broad concept, while the performance objective is specified in measurable behavioral terms and is the means employed to achieve the desired end.

A number of long-term programs have refined the development of their performance modules to the point where there is a high degree of consistency. For example, the Teaching-Learning Units (TLUs) of Project PLAN, the "UNIPACS" within the /I/D/E/A project, and the Learning Activity Packages (LAPs) originated in the Nova Project have at least five common elements: (a) concept focus; (b) behaviorally stated objectives; (c) multiple activities and methodologies; (d) diversified learning resources; and (e) evaluation instrumentation. Differing terminology is used, but the components are essentially the same: desired competencies are predetermined, behaviors identified, and task analysis completed; diagnostic, placement, or pre-module tests are constructed and student options developed; resources are made available and management/control subsystems designed; and achievement is measured as

[2] For example, see: Vivian Geddes. "Individualized Self-Paced English." *English Journal* 61: 413-16; March 1972; Myron W. Ritter. "Individualized Study in Coatsville." *NASSP Bulletin* 54: 70-78; November 1970; and Arthur A. Herd. "Successful Practices in Individualized Instruction." *NASSP Bulletin* 55: 75-82; December 1971.

the degree of discrepancy from a predetermined standard of performance.

## Support Systems

Systems designed to support the instructional process lean heavily on such recent technological developments as audio and video dial access, computers, and telecommunication systems. The work of Suppes and Atkinson at Stanford has given credibility to the role of computers in assisting instruction (CAI). The simplest programs are written for drill. Experimentation is under way for more flexible and sophisticated programs in a tutorial mode. The cost is of course a limiting factor at present.

Since the 1950's the telephone has been an underdeveloped but potentially valuable resource for instruction. The addition of the electrowriter in the 1960's reactivated interest in "remote blackboard" approaches to instruction and in possibilities for telephone-based systems. The refinement of the video cassette is another technological advance that will add flexibility to future instructional systems.

## Problems

Problems associated with systematic instruction can be categorized as those predominantly conceptual in nature and those that are operational or logistical. Conceptual concerns are related to value positions and other philosophical issues. Broudy, in a specific critique of performance-based education,[3] and Nash, in a discussion of humanistic studies,[4] caution educators to be aware of the varied dimensions associated with the total educational enterprise. Nash calls for continued attention to feeling, thinking, and relating. Broudy states that performance-based programs can accommodate didactics (impartation of knowledge by teacher to pupil), but are not adaptable in areas of heuristics (effort to help the pupil discover himself) and philetics (securing rapport with pupils).[5]

The pressure for accountability and the fear that the movement toward predetermined objectives will limit programs whose objectives are not presently quantifiable are of concern to many. Popham addresses himself to the latter issue as well as that of expressive objectives in a "sponsored dialogue" recorded in the *Educational Researcher*.[6]

In search of possible solutions to operational problems, agencies and institutions are joining in the development of alternatives. At least three major areas are under examination: (a) construction of and "banking" of behavioral objectives, (b) validation of materials, and (c) management of instructional systems. Some school districts have launched intensive in-service programs for classroom teachers and others pressed to prepare specific "Magerian" objectives.[7] Other districts rely on the exchange of objectives, as from the Instructional Objectives Exchange (IOX).[8] The scarcity of validated materials is also an operational problem.

Commercial producers ordinarily do not spend the R & D funds necessary to field test and validate their products adequately. The sharing of locally produced materials is a temporary solution. This is aided to some degree by county-wide clearinghouses, sponsored "package-banks," and published catalogs.[9] The Southwest Regional Laboratory (SWRL) may be one of the most promising

[3] Harry S. Broudy. *A Critique of Performance-Based Teacher Education*. Washington, D.C.: American Association of Colleges for Teacher Education, May 1972.

[4] Paul Nash. "The Major Purposes of the Humanistic and Behavioral Studies in Teacher Education." Prepared for working conference of AACTE, Washington, D.C., April 1971.

[5] Harry S. Broudy, *op. cit.*, pp. 5-6.

[6] "Instructional Objectives: An ER Dialogue with Researcher, Supervisor, and Teacher." *Educational Researcher* 1: 8-12; September 1972.

[7] Thomas S. Sietz. "An Institute Program Designed To Train Vocational Education and Academic Teachers for the Development of Performance Objectives." Willingboro Public School District, 1971. ED 055 037.

[8] Instructional Objectives Exchange. A nonprofit educational corporation. P.O. Box 24095, Los Angeles, California 90024.

[9] "Catalogue of Basic Educational Systems." Washington, D.C.: Civil Service Commission Bureau of Training, March 1971.

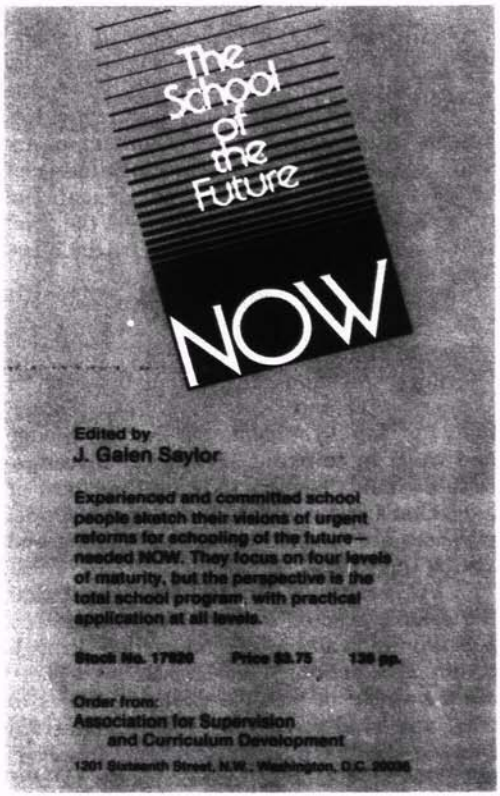
models to watch as it develops user-oriented processes for producing research-based, quality-verified instructional systems.[10] The third problem area, system design and management, is being studied by both individuals and organizations.[11] If "answers" are not being produced, at least alternatives are being developed and tested.

## Future Prospects

A review of literature, ERIC documents, bibliographies, and field reports support the view that the "systematic approach" to instruction is an emerging reality. Nationwide, there is taxpayer pressure to define what is intended, how well it is accomplished, and at what cost. In California, teachers are being evaluated in terms of student progress. In Florida [12] and Georgia,[13] the state departments of education are mounting massive in-service programs to train personnel in specified predetermined competencies.

The teaching profession itself is undergoing critical changes, many paving the way for a more systematic approach to decision making. At governmental invitation, 80 training institutions submitted Teacher Education Model proposals based on systematic planning techniques. Even though Phase III is not funded, the eight models selected for Phase II "Feasibility Studies" continue to serve as resources for further systematic development of alternatives. Selected Teacher Corps projects are urging integration of systematic instruction and traditional teacher education. The Texas Teacher Center Project, working with the American Association of Colleges for Teacher Education, serves as a central forum for continuous study of systematic instruction.

That systematic development of instructional alternatives *can* be a viable component of future education seems evident. The challenge remains that to develop the potential we must learn how to use systematic tools and techniques better to optimize the process of learning for each educational participant. □




[10] Robert L. Baker and Richard E. Schutz. *Instructional Product Research.* New York: Van Nostrand Reinhold Co., 1972.

[11] For example, see: M. David Merrill, editor. *Instructional Design: Readings.* Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1971; John McManama. *Systems Analysis for Effective Administration.* West Nyack, New York: Parker Publishing Company, Inc., 1971; Frank W. Banghart. *Educational Systems Analysis.* New York: The Macmillan Company, 1969; "Instructional Development: An Emerging Process." *Audiovisual Instruction* 16 (10): whole issue; December 1971; "Instructional Development: By Design or by Chance?" *Audiovisual Instruction* 17 (8): whole issue; October 1972; and Polly Carpenter. "Developing a Methodology for Designing Systems of Instruction." *Educational Technology* 12: 25-29; July 1972.

[12] The Florida Program for Improving the Training, Evaluation, and Licensure of Educational Personnel." Tallahassee: Florida State Department of Education, April 1971. ED 055 050.

[13] Jay C. Smith and William A. Crump. "An Application of Instructional Development in a State Department of Education." *Audiovisual Instruction* 17: 18-23; October 1972.

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