Is it too complex or too difficult for teachers in today’s classrooms to formulate instruction or to implement strategies that encourage problem-solving modes of thought? While in-service training programs emphasizing productive thinking processes and creative problem-solving support a negative response (2, 8, 11, 14, 15), a panel of experts agree: There is little evidence to suggest that many teachers are aware of problem-solving methods, let alone the use of these techniques as a method of instruction.

While the expression of a need for increased emphasis on the cultivation of intellectual processes continues, more recently the focus has been on the need for the development of problem-solving skills. One may be prompted to ask, “How do you define the word problem?” or “What is meant by the term intellectual processes?”

Parnes believes that the word problem has particular meaning when used to describe a perplexing situation (8). It is from the benchmark of complexity that curiosity may be aroused, motivation enhanced, and inquiry initiated in the classroom. It may be said that a problem poses a personal challenge to cope with unknowns and to go beyond the application of known skills for the purpose of achieving a solution (12). Within the classroom, the word problem may have application to a variety of perplexing teaching and learning situations encompassing human behavior.

Cole, a foremost investigator of process education, suggests that processes are intellectual skills which are highly transferable. The skills which are most frequently emphasized in process education are those which relate to learning and to analytic, productive, and expressive thinking (3). Williams, in reporting the work of the National Schools Project, specifically identifies productive thinking processes and further draws the cognitive-affective distinction. Cognitive processes: fluency, flexibility, elaboration, and originality. Affective processes: curiosity, risk taking, preference for complexity, and intuition (14). Other processes thought to have problem-solving relevance are generalization, prediction, restructuring, integration, and synthesis. The justification of educational practices supporting the deliberate and purposeful development of processing skills has been lucidly stated by Cole (3):

1. The store of knowledge is so vast that it is impossible to instruct the student in anything but a small portion of what is known.
2. The acquisition of skills ensures an in-

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dividual who can successfully solve problems, and this leads to a healthy and productive personality.

3. Skills are more widely applicable than knowledge and information.

4. Information may be easily obtained when needed, but skills cannot be "looked up."

**Evolutionary Nature of Problem Solving**

Often equated with scientific methods of inquiry, problem solving has only recently been given consideration as an instructional method for classroom teaching and learning. The evolutionary development of problem solving from a classical mode of thought to a teaching and learning model is made apparent in "A Comparison of Problem-Solving Models," which appears as Figure 1.

The pioneering work of Dewey stands foremost in the scholarly work in the problem-solving field (4). While not represented in Figure 1, the work of Wallas (13) and Rossman (10) must be acknowledged and their introduction of productive thinking as a step in problem solving properly noted. Bloom includes problem solving, viewed as a guide for the application of knowledge, as Level 3.00 in the *Taxonomy of Educational Objectives* (1). The Parnes Model (8), while recognized as having general application, has been used extensively as an instructional plan at the Annual Creative Problem-Solving Institute held in Buffalo, New York (9).

A more recent work, and an outgrowth of his Structure of Intellect Model, has been prepared by Guilford (6). Cyclical in design, the Guilford operational model makes provision for information input and for evaluation at each of the successive steps. It is significant to note that, in the original work, the Guilford Model appears in linear form. The adaptation in Figure 1 is a partial representation which appears for comparative purposes. The Instructional Model appearing in Figure 1 is an outgrowth of previously developed models and is designed to serve as a guide for teaching and learning. It is in this respect that the evolutionary nature of problem solving becomes evident.

Viewed as a plan to encourage and develop intellectual processes, the Instructional Model has application across a diverse field of teaching and learning experiences. The dualistic nature of teaching and learning is described step by step in Figure 2. An effort has been made to outline sequentially the processes and behaviors that are encouraged in the learner and the cueing strategies and instructional techniques that may be used by the teacher to bring them about. While appearing in very brief form, the Instructional Model is suggestive of a host of strategies adaptable for use at all levels of instruction.

**A Life Style for Self-Actualization**

PSMCI (Problem-Solving Modes of Classroom Instruction) makes provision for the enhancement of a large number, if not all, of the known intellectual skills. As a plan for processing knowledge and experience, PSMCI assists the learner in adding value through modification and application.
PSMCI is humane and individualistic; the expression of feelings, attitudes, and values is encouraged.

As an experiential mode, PSMCI places the learner in an active role, and options are provided to accommodate his unique talent and style of learning. Intellectual and personal growth is considered to be both possible and probable, and thus each individual is given assistance and an opportunity to become increasingly self-directed and self-sufficient in his ability to cope creatively with life's realities (5).

Educational experiences gained through PSMCI serve to bring about a positive outlook as the learner begins to realize that he has control of his destiny. From a futuristic vantage point, he learns that decisions made today will quite likely have a pronounced effect on his life and the lives of others in time to come. As a proposed life style for self-actualization and self-fulfillment both now and in the future, problem solving may very well be the most important collection of intellectual skills that the schools single out as learning objectives (7).

References


