

Research in Review

Column Editor: Ira J. Gordon

Pressures and Concerns: Ends and Means

THIS past weekend, reading the newspapers at leisure, was an education in itself in the ongoing topic of "Pressures and Concerns in Education." One AP release concerned a meeting of the high school principals in which Dartmouth college mathematics professor John E. Kemeny said that "We are losing many badly needed mathematicians because of boredom, poor instruction and an outdated curriculum." In particular, grade school teachers were criticized for being weak in arithmetic and because their mathematical education generally had been scandalously neglected.

My other Sunday paper had a release from Science Service about mathematics. In particular, the study by Patrick Suppes at Stanford was mentioned in terms of the introduction into the kindergarten of the notion of sets. It concluded: "Although Dr. Suppes cannot yet evaluate the results of his experiments, he does believe that very young children can handle significantly more complex material than they are given in the conventional curriculum as well as the technical vocabulary." So we have poorly trained elementary teachers teaching outdated arithmetic competing with mathematicians who wish to teach sets in the kindergarten.

The rest of the same page was devoted to the progress report of the Florida Space Era Education Study Committee.

This report, concerned with higher education, stressed the crucial shortage of engineers and technically trained personnel. It pointed up the need for high quality education, to begin in the elementary school and to continue through the university. The goal now set for us is the production of technicians and engineers and scientists to keep Cape Canaveral going.

The First Arena

The last item was most revealing. The city managers in the state requested that the universities consider offering a bachelor's degree in public administration because of the need to produce men who can function in government. This request was rejected. We are to serve Canaveral but not each other.

Monday's paper, in a *New York Herald Tribune* release, reported on the UN Science Unit meeting. Secretary-General U Thant was quoted as saying that in some way science must be made to remain aware of its human origin and its human destination.

The pressures are plain and the concerns realistic. There is no doubt that we are living in a scientific era and that scientists must be trained. Yet it is strange that virtually nobody is talking about training anybody else. Is the function of

the elementary school and the high school the production of people who can get Ph.D.'s from universities so that they can work at Cape Canaveral? Where did the humanities go? What happens to the social scientists?

Are we climbing aboard a new bandwagon? Have we shifted our focus so rapidly from being interested in what happens to people to meeting only our technical and space-age needs? I had always considered myself an education liberal and rather fancied myself as an angry young man attacking the fortresses of traditional education. I now find myself in the strange position, because I still believe in a people-centered world or essentially a child-centered curriculum, of being considered an old fogey—a traditionalist—a rigid person unwilling to recognize where the world is going. The first arena, then, is concerned with ends.

The Second Arena

But "means" are the second arena and the one most amenable to research. The "new liberal" has gone back now to the almost factor-psychology of training the mind. He concerns himself with inquiry training and concept development, in which the child who is inquiring often takes a backseat to the process of inquiry. Piaget, who for 30 years was either ignored or ridiculed by American psychologists for his non-statistical, non-rigorous techniques, has now become the fair-haired boy of those who wish more rigor.

The representatives of the various disciplines such as mathematics, biology, physics and chemistry, who recognize the need for rigorous research within their own disciplines, often espouse sloppy research techniques in education in which their feelings or attitudes are accepted as good enough evidence. Or, they ignore

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completely the need for careful classroom studies. They are naive about transfer of training, and seem to assume that if the pupil learns the structure of that discipline, application to human problems will virtually take care of itself. They seek to impose means to meet what they see as the task of education.

We are urged to develop curricula that stem from the structure of the disciplines even though the people within the disciplines are unable to define this structure for us. We are urged to engage in verbal inquiry training, when the research evidence in the inquiry training study is that youngsters, even gifted youngsters (who were, by the way, the only ones studied), did not arrive at the concept although they learned how to ask a question (Suchman, 1961).

This is not a rejection of the need for newer curricula or the use of discovery—indeed I am very much in favor of these

approaches in general—but this is a plea for using the yardstick of rigorous research in classroom settings and in laboratories that approximate classroom learning. This is a plea for caution, for exploration, for being more sure of ourselves before we go off again on a joyous hayride.

If the goal is the production of scientists, what evidence exists or is being accumulated to demonstrate the efficiency of these newer approaches? Do their means achieve their goals? Let us not make them nationwide without adequate tests. We have a stronger FDA to prevent thalidomide tragedies, but educational tragedies in the long run could be just as devastating. *If the goal is an educated citizenry, able to cope with social problems, where are the bold experiments in this area?*

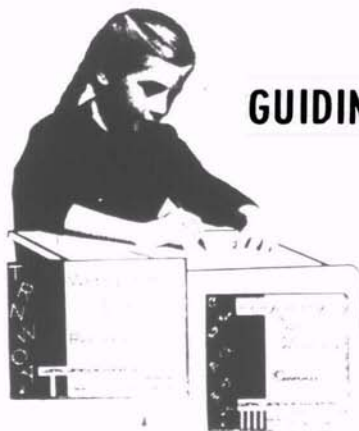
Second, in terms of means, we need to examine very carefully Bruner's hypoth-

esis, "that any subject can be taught effectively in some intellectually honest form to any child at any stage of development" (1960, 33). As Bruner says, it is a bold hypothesis; but let us not forget that it is *an hypothesis*. It is stated so broadly that many errors can occur at the various deductive levels down to the operational definition stage. To say that any subject can be taught effectively at any stage does not mean that we can jump to sets in the kindergarten. Curricula should not be constructed on the basis of this hypothesis without a good deal of careful testing.

How does this hypothesis correspond with the well established formula of child psychologists that $R=f(A)$, that response is a function of age, with due allowances for environmental experience and individuality? How does it, indeed, fit in with Piaget?

Bruner, in *A Study in Thinking* (1956).

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found that different Harvard students engaged in different strategies. Although these strategies were partly a function of the external situation—time, order of presentation, etc.—there was such a thing as individual consistency. Sigel's work also stresses this notion (1963). Some people attack problems differently than others. Curriculum developers must pay attention to cognitive styles, must study the various ways in which youngsters develop strategies. They must analyze the variables which influence the development of cognitive style. We have learned the hard way to speak of the perceiver in perception. Do we need to learn again the hard way not to forget the thinker in the thought process?

Research must proceed, therefore, on two levels—fundamental and applied. Two kinds of fundamental research are needed. The first is research using R of (A). The replication studies by Elkind (1962) of Piaget's work offer a model. The crucial question is how much of A is *not* chronological age, but really culturally determined experience. What variables influence changes in the age at which concepts are learned or thought processes modified? At the very least, social class and school learning present themselves. What is the role of planned learning programs?

Second, research into the role of intra-personal variables in thought processes, such as the work of Sigel, Kagan and Guilford is essential. We need to extract some order out of our studies of creativity and cognition in which we may perhaps see cognitive style as a common denominator. It should be possible to design studies to explore whether divergent people use other strategies than convergent in concept attainment. By definition one would expect this.

From the applied direction, we need

classroom research into the application of knowledge of cognition in the classroom. The work of Crabtree (1962) is an example of what must be done to reduce an ambiguous, high-level hypothesis down to operational terms for testing.

Learner and Content

Taba's (1962) notion of the transactional relationship between the learner and the content to be learned needs to be reduced to experimental operations. If the learner must construct his own conceptual schemata, and if the content has a preconceived structure, is there not a danger of contradiction in terms? Is the learner, or should the learner be really free to construct his own scheme? Suppose it differs from the expert's structure?

Careful evaluation of the new mathematics and science curricula to see whether they apply what is known about learning and discovery and to test such vague constructs as "the structure of the discipline," is also required.

Another pressure arises from technological advance. We are pushed to ETV and the like. Yet, in terms of concept attainment via discovery, can this be done? In Wright and Proctor's (1962) work "On Teaching High School Geometry" it was demonstrated clearly that the small group working with the teacher was the superior method for the development of problem solving in high school geometry.

How do we reconcile the pressure for teaching "discovery" with the pressure of team teaching, ETV, and "the structure of the discipline"? How can one do what Taba suggests? How can learning be transactional via the television set? How can the learner be "autonomous" in a "structure of the discipline" curriculum?

We have, then, a number of pressures on us, most of which are for the production of the specialist and the scientist. We have the pressure to remodel the curriculum for the space age, to teach children to think—something we have always had—to use the structure of the discipline as the model and to make use of the mass media and newer electronic techniques in the education of youth. Most of all, we must have the pressure of our belief in the dignity of man. What we need is to examine these pressures dispassionately and rationally—to use our own ability to think and not be stampeded. Primarily we need to refocus on our ultimate aim, which is the education of a child to live an effective life in a democratic society. As Adlai Stevenson recently stated:

The enemies of freedom, whatever the magnificent ends they propose—the brotherhood of man, the kingdom of saints, "from each according to his ability, to each according to his needs"—miss just this essential point: That man is greater than the social purposes to which he can be put. He must not be kicked about even with the most high-minded objectives. He is not a means or an instrument. He is an end in himself.

References

- D. Ausubel. "Learning by Discovery: Rationale and Mystique." *Bulletin of the National Association of Secondary-School Principals* 45: 18-58; 1961.
- J. Bruner *et al.* *A Study of Thinking*. New York: John Wiley & Sons, Inc., 1956.
- J. Bruner. *The Process of Education*. Cambridge, Massachusetts: The Harvard University Press, 1960.
- J. Tapham Byers. "Strategies and Learning Set in Concept Attainment." *Dissertation Abstracts* 22: 1904; No. 6; 1962.
- C. A. Crabtree. "Effects of Structuring on Productiveness of Children's Thinking: A Study of Second Grade Dramatic Play Pat-

terns Centered in Harbor and Airport Activities Under Two Types of Teacher Structuring." *Dissertation Abstracts* 23: 161; July 1962.

D. Elkind. "The Development of Quantitative Thinking: A Systematic Replication of Piaget's Studies." *Journal of Genetic Psychology* 98: 37-46; 1961. (This is one of a series by Elkind appearing in 1961-1963 in this *Journal*.)

R. Ojemann. "Investigations on the Effects of Teaching an Understanding and Appreciation of Behavior Dynamics." *Prevention of Mental Disorders in Children*. New York: Basic Books, 1961. p. 378-97.

I. Sigel. "How Intelligence Tests Limit Understanding of Intelligence." *Merrill-Palmer Quarterly* 9: 39-56; 1963.

R. Suchman. "Inquiry Training: Building Skills for Autonomous Discovery." *Merrill-Palmer Quarterly* 7: 147-70; 1961.

H. Taba. "Learning by Discovery: Psychological and Educational Rationale." Paper given at American Educational Research Association meeting, 1962.

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Outside Influence

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requires educators who are leaders with vision and imagination. These educators must be willing and able to make intelligent decisions and, having made them, to carry them out.

To involve community resources in the educative process is to chart a course which has many possible directions. Once set in motion, there is little likelihood of turning back. The educational good to be derived from the process is worth the dangers involved. Indeed, the modern educator will be wise to identify early and to use well the vast educational opportunities available for today's students.

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