IMPACT OF RESEARCH ON CLASSROOM

Research has helped to influence education principally through (a) the design of classroom materials, (b) conceptualizing the nature of the human learner, and (c) the solution of particular problems.

THE relation between educational research and educational practice is a complex one. It is not a matter of a research worker producing solutions to problems and the teacher applying them. Indeed, this has rarely been the way in which psychological research has had impact on classroom practice. Let us look at some of the important ways in which research has influenced education.

The Design of Classroom Materials

The most obvious source of impact has been on the design of classroom materials. Thorndike's word counts, and the subsequent development of methods of measuring the difficulty level of reading material, had important impact on the design of schoolbooks for over half a century. Few books for sale to schools today ever go to press without first being subjected to an analysis of reading difficulty. The design of dictionaries for children was also another spinoff of Thorndike's research on word counts, the influence of which has been enormous.

A new and important influence on the design of materials for schools has been the work of Jean Piaget, whose model of the intellect has become a basis for the design of mathematics and science curricula. The British Nuffield Mathematics materials and the Nuffield Science materials are excellent examples of this, with manuals explaining to the teacher how each item in the materials is related to particular aspects of Piaget's model of the intellect. Although the latter materials are commonly found in the classrooms of innovative teachers, they have not been widely used in America largely because few teachers are familiar with Piaget's contribution to child development. However, the SCIS science program, also designed partly in terms of concepts formulated by Piaget, has had considerable use in American classrooms.

One can say, with some certainty, that many of the materials developed for American schools in the next decade, in science and mathematics, will bear the imprint of

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the psychological work of Piaget. Teachers who use such materials should acquire some understanding of Piaget's work and be able to distinguish those materials that are well constructed on the basis of it, and those that drag in the name of Piaget in the hope that it will promote sales. Teachers have to learn to be discriminating in this respect. Perhaps they should also realize that Russian curriculum experts have some reservations concerning the value of Piaget's work for designing educational materials.

The impact of Thorndike and Piaget will probably remain, perhaps because they were so well grounded in empirical research. Other attempts to use the work of psychologists to influence the form of school materials have been more transitory. When operant psychologists reinvented the catechism, calling it a programmed text, the enterprise was hailed by some as a triumph of research and development, but it had only transitory acceptance, perhaps partly because it lacked a solid foundation of research on human learners and partly because it was based on a very naïve epistemology or theory of knowledge.

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The Nature of the Human Learner

A second way in which research has an impact on teaching is through providing a conceptualization of the nature of the human learner. All teaching, even the worst forms of teaching, is based on some conception of the nature of the learner. In this century, teachers' conceptions of learners have come to be progressively more influenced by the beliefs of behavioral scientists. Conceptions of the nature of the human learner have been derived from many sources in the past. The scholastics derived their conception of the learner from religion, viewing him or her as a soul that had to be saved through the acquisition of eternal truths. For example, Aquinas introduced teachers to a theory of determinism in behavior almost as rigid as that found among modern behaviorists. Much instruction was reduced to the catechism form which, like its modern counterpart the programmed text, called for 100 percent mastery of the content. In contrast, Montessori derived a view of the learner from the knowledge that physicians, biologists, and psychologists had acquired informally about child development, a fact which is hardly surprising in view of her own medical and scientific background. She was able to use such knowledge, together with her understanding of the hierarchical structure of cognitive growth, to develop her famous curriculum.

In the present century, there has been an increasing trend for teachers to adopt scientists' conceptions of the nature of the human learner. The Thorndike learner was a passive system, waiting to have connections established between stimuli and response. This simplistic model influenced the thinking of many teachers earlier in the century. Later this model became displaced by the operant model which shared many features with that of Thorndike. Teachers, who embraced such models, or who had been indoctrinated in them, rarely understood the assumptions on which they were based. Neither did they recognize that the models had been developed for the purposes of research and were gross overgeneralizations from data, and not

meticulous deductions from scientific experimentation. The fault, perhaps, was not with the teachers, for the promoters of the models themselves often presented the models as though they represented the ultimate in truth, rather than as convenient ways of looking at learners for the purposes of research.

Many teachers during the past half century could not embrace the simplistic models of either connectionism or operant psychology. Alternative models were available, but none carried the hallmark of a distinguished scientist. The Progressive Education Movement tied itself closely to the philosophical position of John Dewey and the model of the human learner that this philosophy implied. In contrast to connectionism, or operant psychology, the learner was viewed as an active searcher after truth and a system that formulated hypotheses about the nature of the environment, and then worked on testing them. Such a conceptualization of the nature of the learner lacked a scientific basis at the time when it emerged as a positive influence on classroom practice during the 1930's, but in the past decade it has become more and more associated with the research of Piaget, who uses this conceptualization of human learning as a part of the framework within which he does his research. Piaget himself has expressed his general agreement with the viewpoint of Dewey, and the scientific status of Piaget's research has given his model of behavior enormous prestige.

This latter type of model has been referred to as the humanistic model, a term which has the doubtful distinction of having no clear meaning. Nevertheless the model includes fairly well defined attributes of child behavior such as that intelligence is basically inventive, that the child creates logic to solve problems, that knowledge, though tied to action, requires an internal representation system, except at the most elementary level, and so forth.

These conceptualizations of the human learner are often as much philosophical as they are scientific. Often they are just sets of assumptions. For example, Skinner's assumption that all behavior is controlled by the environment is a philosophical position and there is no way of conducting a program of experimental studies to show that this assumption is correct. Piaget's position is, perhaps, a little nearer to being experimentally verifiable. Teachers, like scientists, need a set of simplifying ideas to guide their work and the simplifying ideas of the scientist, or the scientist turned philosopher, seem to have a certain appropriateness for guiding the work of the teacher. The danger comes when either the teacher, or the scientist, begins to believe that his or her assumptions represent eternal truths. What the teacher needs is a set of reasonable assumptions, but teachers have to realize that what is a reasonable set of assumptions for doing research may not be a reasonable set of assumptions for running a classroom. Also, the assumptions made in running a classroom have to be acceptable to the culture at large and to the parents. The kind of regimented classrooms that flow from the ideas of operant psychologists are unlikely to be acceptable to well-educated parents. Those who wish to see the classroom as a preparation for living in a democratic community may also see such a classroom as antithetical to the achievement of such a goal.

The Solution of Particular Problems

A third way in which scientific research is considered by some to have potential for influencing the classroom practice is through providing the teacher with information that has applicability to the solution of particular problems that arise. The bureaucratic form of this concept of research and development in education is that the improvement of education will come through compiling an inventory of the problems that classroom teachers encounter and then discovering, through research, the solution to each. This concept of educational research, and its application, has long been promoted by federal agencies, including the U.S. Office of Education and the National Institute of Education.

This formula for research and development has long been favored by practical

educators pressed with problems needing a practical and immediate solution. The failure of research workers to produce specific answers to specific problems has often resulted in the work of the researcher being dubbed as useless. Of course, researchers in some fields do sometimes come up with quite specific solutions to particular problems, but these are generally cases in which precisely the same problem recurs on innumerable occasions, in precisely the same form.

For example, in the medical field, a solution to the poliomyelitis problem could be found because the disease is caused by a small group of viruses that have produced precisely the same symptoms in millions of individuals. Teachers do not encounter a relatively few, well-defined, constantly recurring problems, but a vast range of problems. Even when the same problem seems to occur twice, the cause may be different on the two occasions. The model for undertaking and applying medical research is not a suitable model for undertaking educational research. Indeed, the model of research involved in solving the poliomyelitis problem is not the model used in relating most research to practical endeavors.

John Dewey [1] long ago recognized that research could not provide a cookbook for solving problems in practical fields. The bridge designer uses Newtonian principles as a general guide to the solution of design problems, but the Newtonian principles do not provide very direct answers to the questions he or she may ask. In the same way, Piaget's description of the development of logical behavior in children can provide a very general framework for the development of curricula related to logical development, but only a very general framework. Piaget's findings have to be used in the context of the problems that children encounter, and the problems of children in a Midwest school may be very different from those that children encounter in Geneva, Switzerland.

Consider another example. Research on memory indicates that information is likely to be transferred from short-term memory to long-term memory if the receiver of the information expects to use it at a later date, but information which children in one locality expect to use later is not the information that children elsewhere expect to use later. Again, simple reinforcement may sometimes be applied effectively for improving learning, but the blind use of such procedures, on a routine basis, may be as ineffective as the blind application of any other piece of laboratory-derived knowledge. The real problems of the real world outside of the scientific laboratory have so many conditions influencing outcomes, that do not occur in the laboratory, that scientific findings must be cautiously used as only rough guides to action.

In my experience, teachers show considerable sense in deciding whether particular areas of scientific inquiry do or do not have implications for classroom use. Although educational practice has long been plagued by fads, the scientific knowledge that has slowly been assimilated, over the years, into classroom practice, has been that which has stood the test of time. A description of classrooms and teaching today shows practices that are vastly superior to those described by Joseph Mayer Rice in the 1890's. Most of the changes represent changes in our conception of the nature of the human learner, derived from a wide range of psychological and sociological studies, but there are also many changes in the materials used for instruction that are traceable to psychological research.

This slow and cautious assimilation of psychological knowledge, bypassing the fads of any particular decade, has been a force for the good. One hopes it will continue. Unfortunately, a new force evident on the horizon is the attempt by some commercial firms and individuals to merchandise, with evangelistic zeal, particular viewpoints and materials related to them. Teachers must become more aware of the fact that the merchandising of psychology may be a self-serving enterprise for those who do it, and not a dissemination of what will be recognized ultimately as truth. □

[1] John Dewey. *The Sources of a Science of Education*. New York: Liveright Publishing Corporation, 1929.