A REVIEW OF GAGE'S HANDBOOK OF RESEARCH ON TEACHING

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Handbook of Research on Teaching by N. L. Gage (Editor). Chicago: Rand McNally & Co., 1963. Pp v + 121[9]. ($15.00)

Reviewers in educational journals have been warmly enthusiastic over publication of the Handbook of Research on Teaching. There is general agreement that the Handbook will influence the direction and quality of educational research for years to come. The little criticism that has appeared has reflected disappointment with the uneven quality of research rather than with the quality of research reporting. The Handbook may help eradicate the kind of sterile research that leads nowhere--except, perhaps, to the awarding of an academic degree--by becoming a kind of "Bureau of Standards" for educational research.

The Handbook may have two highly laudable effects: (1) to establish objective criteria that allow qualitative ratings of research along a continuum from "trivial" to "highly significant" and (2) to allow researchers to build on a foundation of fruitful findings rather than to strike out independently and rather blindly in obedience to the dictum that they shall conduct an "original" investigation. All too often such investigators, in an effort to be unique, neglect to explore and develop the few theory-based concepts that appear and reappear from time to time like the mocking face of the Cheshire cat. The Handbook may help researchers to focus more clearly on fundamental rather than superficial concepts and processes, thus to carry out Editor Gage's purpose, ".... to begin at a higher level of competence and sophistication, to avoid past mistakes and blind alleys, to capitalize on the best that has been thought and done."

Pragmatic rather than literary, functional rather than historical, the Handbook exudes the convincing authority of those who do research rather than merely talk or write about it. If teachers may be thought of as those who till the soil of learning in a kind of human garden, then we have here a "gardner's handbook" that describes in detail hundreds of efforts to cultivate and measure learning under varied conditions. Happily for the reader, the thirty-one authors were

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selected not only for their recognized scholarship in their respective fields but for their ability to clarify concepts which, particularly in the areas of experimental method and statistics, are misunderstood by most of the people most of the time. Considering the abstruse and technical nature of some of the topics, the writers communicate their ideas clearly and in comprehensive detail but not at the cost of over-simplification. If the Handbook represents a transition from research characterized by Charters as based upon "gross, programatically defined concepts" to research employing "penetrating concepts from the behavioral sciences," the credit for this new and exciting phase will in no small measure belong to the editor and authors who have such a passion for clarity of expression. They have taken upon themselves the monumental responsibility of acquainting a new generation of researchers of that which is worthy to be remembered. They have acquitted themselves well.

In twenty-three chapters the authors present the studies that remain after hundreds have been sifted through the coarse screen, "substantive problems and findings," a framework suggested by the editor and an advisory board consisting largely of the Committee on Teacher Effectiveness of the American Educational Research Association. The volume is arranged in four parts: I. Theoretical Orientations, II. Methodologies in Research on Teaching, III. Major variables and Areas of Research on Teaching, and IV. Research on Teaching Various Grade Levels and Subject Matters.

Part I, leading off with Broudy's "Historic Exemplars of Teaching Method," aptly places educational research in proper historic perspective. The current educational ferment is not without parallel as Broudy traces the rise and decline of movements and reforms from the Socratic dialectic through Jesuit education to the teachings of Pestalozzi, Froebel, and Herbart. Classicists who lament contemporary ignorance of past great minds and their ideas should take heart. For the pendulum swings back and forth and what has been relinquished to dusty oblivion conceivably could be "discovered" any day now. Broudy notes that Comenius pleaded for the development of understanding in preference to slavish dependence upon memorization. Today curricular reformers show the same concern. Like beasts of burden yoked to a big wheel, educators slowly walk around and around in each others' footsteps.

Another necessary framework to which the developing science of education may be related is Brodbeck's chapter "Logic and Scientific Method in Research on Teaching." The tortuous process of properly placing educational phenomena

within the structure of an emerging science receives a penetrating analysis as Brodbeck defines and critically examines concepts, facts, laws, hypotheses, operational definitions, theoretical constructs, models, causation, and other topics.

Required reading for educational researchers should be Dr. Gage's chapter, "Paradigms for Research on Teaching." A variety of graphic conceptualizations of instructional processes appear in the chapter. It would seem that drawing paradigms is a necessary step in planning research. These schematic diagrams should make definitions more operational, and like an architect's preliminary sketches, are helpful for constructing theory.

Tatsuoka and Tiedeman render a distinct service to non-statisticians in their chapter, "Statistics as an Aspect of Scientific Method in Research on Teaching." They organize in a series of tables parametric and non-parametric statistical techniques, recommending the use of a particular test according to type of scale used--nominal, ordinal, interval or ratio--and the number of variables in the design.

In similar fashion Campbell and Stanley list experimental and quasi-experimental designs and the presence or absence of eight sources of invalidity for each one of sixteen designs. They carefully discuss the effects of these sources of measurement-weakness. Frequently in their chapter they point out the weaknesses of the matching experimental design. They warn about relying on the "once-and-for-all definitive experiment." Instead, studies should be made of "dimensional relationships and interactions along many degrees of the experimental variables."

In view of the fact that "the great bulk of educational experiments show no significant difference," it would be "highly desirable" to employ a more precise method of analysis such as analysis of variance and covariance, they argue. With refreshing honesty they advise would-be researchers to anticipate defeat and to "justify experimentation...not as a panacea, but rather as the only available route to cumulative progress."

Medley and Mitzel strongly reinforce the plea for greater use of analysis of variance techniques. In their chapter, "Measuring Classroom Behavior by Systematic Observation," they demonstrate in painstaking detail the power of analysis of covariance for squeezing maximum meaning from data. Using previously unpublished material to illustrate this technique, they methodically test a series of eight hypotheses, and discover nothing new. However, they find that

they can reject the ninth and final null hypothesis. By contrast, a conventional correlational technique applied to the same data permits testing only one hypothesis--and that one to no avail.

The authors review methods for observing classroom behavior that have been developed during the past half-century. They express a hope for a theory of classroom learning and indicate the research of B. O. Smith and Wright and Proctor as being steps toward such a theory.

Remmers analyzes rating scales and describes ways of constructing graphic rating scales in his chapter, "Rating Methods in Research on Teaching." He also discusses techniques for collecting and analyzing sociometric data and describes the semantic differential, Q-technique, and a self-anchoring rating scale.

Bloom's chapter, "Testing Cognitive Ability and Achievement," though short, is a valuable contribution to the literature of mental measurement. Dr. Bloom explores problems that constantly perplex teachers, administrators, and others concerned with the meaning of test results. He lists causes of regression-toward-the-mean, and discusses effects of achievement examinations upon students, teachers, and curricula.

In a review saturated with references (501 vs. a median of 136 for the twenty-three chapters) Stern, in his chapter "Measuring Noncognitive Variables in Research on Teaching," ranges widely among such topics as the art of teaching: volition; psychopathology; multivariate assessment; the sociology of attitudes and values; depth psychology; perception-oriented studies; causal-genetic, psychometric, situational, and case-study methods; and cognitive and attitudinal changes under varying classroom social-emotional climates.

One review listed 34 studies of student's academic achievement and attitude change as related to varying teaching styles loosely defined along the dimension student-centered vs. teacher-centered. The review shows no clear, general superiority in subject-matter learning for either mode of instruction. However, attitudes in the student-centered classes generally shifted to a more "acceptant, tolerant direction". The stalemate that has developed in educational theory between the traditional and non-directive camps may be due to a failure to articulate teaching technique and student need, Stern suggests. He notes a number of

studies which, he claims, support the theory that grouping pupils according to dominant need, i.e., rigid vs. flexible, and planning instruction with due regard to this prevailing student characteristic--whatever it may be called--results in greater achievement.

Part III opens with a most thought-provoking appraisal of the present status of research on teaching in the chapter by Wallen and Travers, "Analysis and Investigation of Teaching Methods." They trace patterns of teaching behavior to half-a-dozen sources: teaching traditions, social learnings in the teacher's background, philosophical traditions, the teacher's own needs, conditions existing in the school and community, and scientific research on learning. They maintain, "little has been done to develop teaching methods on the basis of scientific knowledge of learning. Most widely advocated teaching methods are based either on a philosophical tradition or on personal needs of teachers." Studies which compare the effectiveness of one teaching method with another can hardly be considered as a program of scientific research because teaching methods have arisen largely from non-scientific sources, they argue.

After reviewing studies of teaching according to the theoretical orientation of investigators and particular patterns of teaching behavior, the authors present a section describing relationships between some teaching methods and some principles of learning. Teachers and administrators could read and reflect upon this section with profit.

Getzels and Jackson make an eloquent plea for more theory-based research in concluding their chapter, "The Teacher's Personality and Characteristics." After reviewing studies of attitudes, values, interests, adjustment, personality factors and needs, projective techniques, cognitive abilities, and other aspects of teacher behavior, they observe that "despite a half-century of prodigious research effort, very little is known for certain about the nature and measurement of teacher personality, or about the relation between teacher personality and teaching effectiveness." Reiterating the criticism of research on teacher effectiveness made by the AERA's Committee on the Criteria of Teacher Effectiveness, the authors argue for the application of theory to educational research rather than depending upon pure empiricism. The chief source of weakness of research in this field is that research "...is conducted in a theoretical vacuum. When studies are not engaged in merely 'trying out a test,' they are busy seeking ad hoc solutions to immediate problems with little regard to the theoretical generalization, and have contributed little "...to our knowledge of

the specific instructional factors that may have been responsible for the observed effect, and thus, per se, they add next to nothing to a science of instruction."

"Such factors should define reproducible stimulus and response characteristics that can be implemented in future instructional materials and devices," he advises. A few of the behavioral characteristics that should be systematically varied in studies of instruction are: time and amount of active response; feedback, reinforcement, and knowledge of results; guidance, cueing, or prompting; prompting vs. confirmation; and organizational and sequencing factors.

In a section entitled, "The Rationale of Experimentation," Lumsdaine urges greater use of randomization in preference to matching or analysis of covariance. He criticises a tendency of educational researchers to interpret findings which do not reject the null hypothesis as a basis for concluding that results were "negative" and that, therefore, a particular factor or treatment is unimportant or "makes no difference." R. A. Fisher's caution that the null hypothesis can only be disproved, not proved, is a fine distinction which has escaped many educational researchers, he notes, adding that there is a great tendency to translate inconclusive findings based upon failure to disprove the null hypothesis into a statement of negative results.

Another serious weakness in educational research is the lack of comparable sensitivity from experiment to experiment dealing with the same variables. Often the result is that equally potent factors in the different experiments do not have the same chance of showing up as significant. This general condition "creates a morass of ambiguity...which has led some...to wonder whether it is worth doing experiments until some basis for achieving comparable sensitivity from experiment to experiment is achieved," Lumsdaine writes. As a possible solution he suggests decision-theory as a rationale for comparison of educational procedures and he offers some valuable advice in the concluding pages of his long chapter for improving educational experimentation.

In their chapter, "Social Interaction in the Classroom," Withall and Lewis review research on cognitive and affective interaction between teachers and learners. This research has sprung from such sources as the mental hygiene movement, the group dynamics experimenters, child development theorists, psychotherapy, and sociometry. They note contributions toward a theory of instruction produced in H. A. Thelen's Human Dynamics Laboratory at the University of Chicago and suggest "... that future research on social interaction in

the classroom may give increasing attention to careful development of theories of the classroom interaction as a dynamic process in which the teacher is an important participant" but does not entirely determine the outcomes of learning.

In a long chapter drawn mainly from the research literature of educational sociology, Charters in his chapter, "The Social Background of Teaching," describes the position of the teacher in the American social structure and the consequences of that position on teacher effectiveness. He examines the value orientations of teachers, the influence of the teaching occupation upon teachers and other topics. Of particular interest is research on styles of administrative behavior as related to teacher attitudes and behavior.

Part IV of the Handbook, "Research on Teaching Various Grade Levels and Subject Matters," is necessarily more specific than the first three parts. An exception is the final chapter, McKeachie's "Research on Teaching at the College and University Level" which in a sense reinforces and sums up many of the thoughtful statements expressed throughout the Handbook. Anyone planning to conduct educational research should read this chapter. Of particular value are learning principles related to teaching and a list of methodological pitfalls lying in the path of the unwary researcher.

McKeachie concurs with Getzels and Jackson that the major problem in experimental comparisons of teaching methods is selecting an appropriate criterion. In an illustrative study one teaching method produced superior achievement and greater short-term interest in psychology, but a follow-up study three years later revealed that no one from the superior achievement group had majored in psychology; however, seven men from each of the other groups taught by contrasting methods did major in the subject.

This problem of measuring the long-range influence of affective variables in classroom learning is examined by Watson in his chapter, "Research on Teaching Science." In view of the national concern for increasing the number of science teachers, attention should be directed less to evaluating science instruction in terms of gains in scores on achievement tests of limited scope and more in terms of the emotional reactions of students to science teaching, Watson holds, charging that "...the almost universal emphasis upon gains in scores...is alarming."

With school systems all over the nation adopting various plans for teaching the "new" or "modern" approach to mathematics, the need is especially acute for research to clarify

the effect of teaching method upon transfer. In his review of "Research on Teaching Secondary School Mathematics" Henderson reports studies of the unverbalized awareness method upon transfer and notes that empirical evidence is yet insufficient despite the claims for this method.

Sears and Dowley conclude their excellent review of "Research on Teaching in the Nursery School" with some recommendations that can be applied to educational research generally. They note that investigations based upon a theory of behavior have generally been more fruitful than investigation, without a theoretical basis, that there is a need for using authentic conditions of actual nursery school environments for further testing variables and procedures developed in controlled experimental situations, that teachers will become more able to stimulate solid research, and that "the promotion of sound scientific knowledge" requires that studies be replicated so that findings can be confirmed on several groups.

Russell and Fea are to be commended for the Herculean task of summarizing "Research on Teaching Reading." The writers packed 368 references into 53 pages. The references cover the history of reading instruction, visual and auditory perception, phonics and alphabet methods, and teaching meaning and comprehension according to purpose and according to subject matter and classroom organization. With many agencies and the public perplexed and concerned over causes of reading disability and more than willing to underwrite carefully designed research, Russell and Fea's chapter offers a mint of ideas.

Metcalf in his chapter on "Research on Teaching the Social Studies" concentrates on empirical studies of reflective method. He observes that the few attempts to test the reflective method have been "feeble and awkward," thus bearing out his complaint that research in teaching social studies is at a stand-still. This impasse will remain in effect, he predicts, until research and theory in teaching the social studies are united.

Inferentially, progress in the other subject matter areas reviewed in the Handbook depends upon the development of a general theory of instruction. Meckel in his chapter on "Research on Teaching Composition and Literature" and Hausman in his "Research on Teaching the Visual Arts" may be giving complete reports of the extent of research in their fields. If so, it appears that research and teaching methods require synthesis. Aside from a theory of instruction, which seems to be the concern of a number of authors, instrumentation and the criterion--two pervasive problems discussed by

Getzels and Jackson--probably plague subject-matter researchers. Unfortunately most commonly used achievement examinations are not sensitive to differences in teaching methods and do not measure attainment of some of the higher cognitive functions as described by Bloom, et. al.

Carroll's informed review of "Research on Teaching Foreign Languages" points out the problem of specializing so narrowly that scientific progress stalls. Psychologists have frequently failed to produce useful results in studies of language teaching because their experimental settings "... have not been sufficiently similar to those of the actual teaching situation" and "...at the same time, research undertaken by foreign language teachers has only rarely been adequate with respect to research methodology." Yet the need is acute for information "...on which to base decisions concerning who should be taught...at what ages instruction should be started and how long it should be continued," Carroll notes.

It appears that each particular subject matter area is wide open to research and that some cross-fertilization between researchers and subject-matter teachers is needed.

Aside from establishing a body of research standards for educators, the publication of the Handbook will probably encourage development and inclusion of courses in research as part of the undergraduate preparation of teachers. Courses in research should be offered apart from statistics. As the whole field of research opens before the wide-eyed neophyte, the reason for statistics and sophisticated experimental designs will become evident, thus producing a situation in which learning is more likely to transpire. The Handbook could and should be a major resource for such courses.

The styles of writing range from Broudy's wise and perceptive eloquence to the detached and necessarily abstract mode typical of statisticians. Generally, the writing employs the loose syntax of people primarily more adept at talking than writing. The Handbook will not win the Nobel prize for literature, but thanks to the sharp eyes of Editor Gage and the quality of scholars selected as authors, the writing is remarkably free of grammatical errors that usually distinguish the writing of educators. I believe I found one split infinitive, but am not positive. However, the proofreader probably got blurry-eyed after the first 1100 pages for type at the bottom of page 1122 is garbled and a slug of type under "Methods of Lecturing" on page 1129 is repeated.

The Handbook should have concluded with a chapter entitled, "What Next?" or "Where Do We Go From Here?" This might have included a list of studies that should be replicated and might also have listed the Ten Commandments of educational research, disobedience of any one of which automatically eliminates a report for consideration as research. There is entirely too much junk that is masquerading as research and that reads either like a telephone directory or like a blurb for the new 350 horse-power Shiz-bang. Better no writing than so much hokum. It is to be hoped that the Handbook will sound taps on the ad hoc age of studies conceived in a theoretical vacuum. We may hope that the day of purely empirical, atheoretical studies is over and that future research may be designed in terms of more fundamental processes from the behavioral sciences.