

Occasional Paper No. 7

RESEARCH ON TEACHING:
A DYNAMIC AREA OF INQUIRY

Judith E. Lanier

Published By

The Institute for Research on Teaching
252 Erickson Hall
Michigan State University
East Lansing, Michigan 48824

Printed and Distributed
by the
College of Education
Michigan State University

October 1978

The work reported herein is sponsored by the Institute for Research on Teaching, College of Education, Michigan State University. The Institute for Research on Teaching is funded primarily by the Teaching Division of the National Institute of Education, United States Department of Health, Education, and Welfare. The opinions expressed in this publication do not necessarily reflect the position, policy, or endorsement of the National Institute of Education. (Contract No. 400-76-0073)

Institute for Research on Teaching

The Institute for Research on Teaching was founded at Michigan State University in 1976 by the National Institute of Education. Following a nationwide competition in 1981, the NIE awarded a second contract to the IRT, extending work through 1984. Funding is also received from other agencies and foundations for individual research projects.

The IRT conducts major research projects aimed at improving classroom teaching, including studies of classroom management strategies, student socialization, the diagnosis and remediation of reading difficulties, and teacher education. IRT researchers are also examining the teaching of specific school subjects such as reading, writing, general mathematics, and science, and are seeking to understand how factors outside the classroom affect teacher decision making.

Researchers from such diverse disciplines as educational psychology, anthropology, sociology, and philosophy cooperate in conducting IRT research. They join forces with public school teachers, who work at the IRT as half-time collaborators in research, helping to design and plan studies, collect data, analyze and interpret results, and disseminate findings.

The IRT publishes research reports, occasional papers, conference proceedings, a newsletter for practitioners, and lists and catalogs of IRT publications. For more information, to receive a list or catalog, and/or to be placed on the IRT mailing list to receive the newsletter, please write to the IRT Editor, Institute for Research on Teaching, 252 Erickson Hall, Michigan State University, East Lansing, Michigan 48824-1034.

Co-Directors: Jere E. Brophy and Andrew C. Porter

Associate Directors: Judith E. Lanier and Richard S. Prawat

Editorial Staff

Editor: Janet Eaton

Assistant Editor: Patricia Nischan

Abstract

The author traces the evolution of research on teaching, examining early approaches and showing how they led into those in use today at the IRT. The earliest research-on-teaching paradigm focused on the personal characteristics of teachers, while the next emphasized classroom teaching behavior. Each approach tended to produce weak results in terms of demonstrated effects on student learning, although studies of teacher behavior were far more promising. Some studies undertaken in the late 1960's and early 1970's began to examine more complex sets of variables and produce more stable and useful findings. The most promising studies acknowledged influence and interaction of teacher judgement, as well as numerous other interviewing variables, on the related process of teaching and learning. In focusing on the mental life of teachers, the research paradigm at the IRT is building on successful earlier research.

Contents

Research on Teaching and Social Research	2
A Brief History of Research on Teaching	4
Toward a Systematic National Effort	9
More Comprehensive Research Paradigms	10
More Diverse Research Methods and Professional Personnel	13
Concluding Remarks	14
References.	16

Research on Teaching: A Dynamic Area of Inquiry¹

Judith E. Lanier²

Discussions of instruction are frequently limited to the interactive processes between teachers and learners. But such discussions overlook the design of instruction, an integral part of professional teaching. Instructional design includes out-of-class teaching activities like planning, correcting papers, and preparing materials for instruction. These out-of-class thoughts and actions clearly affect what happens during class and what students learn. These activities cannot be ignored in any proper treatment of research on instruction. The subject of this paper, therefore, is research on teaching, encompassing those judgments and actions of teaching that can affect the curriculum and instruction that learners encounter in school. Teaching includes the complementary processes of instruction and instructional design.

Research on teaching remains a young field of inquiry. Little of the knowledge accumulated thus far is directly applicable or useful to teaching practice. Until recently only meager investments have been made for research on teaching. I shall first discuss the study of teaching in the general context of social science research. Specific examination of research on teaching will then follow, with emphasis on accomplishments, major issues, and the problems and promise of the future.

¹This paper was originally prepared for a Voice of America Forum Series on Education in the United States: Research and Diversity.

²Judith E. Lanier is co-director of the Institute for Research on Teaching, director of the MSU School of Teacher Education, and professor of curriculum and instruction.

Research on Teaching and Social Research

Knowledge of the serious social complexities humans face around the world is common. But knowledge of what and how we should teach people to cope with complexity is scarce. Thus, as the quality and inequality of human life become concerns of a larger and more complex social order, research on teaching becomes increasingly important. We look eagerly, but with disappointment at the small amount of research knowledge of teaching effectiveness that can presently be applied. Let us first reflect on the reasons why that present knowledge base is so small.

The classic argument over whether teaching was an art or a science may well have slowed empirical work in the field. Many assumed that as an art it was not amenable to scientific inquiry. This argument has now abated. Most authorities agree that teaching contains elements of both art and science and can indeed be systematically studied in a variety of ways.

Another reason for the neglect of research on teaching was the belief that research on learning was sufficient for the improvement of education. But this general view has also changed as scholars have come to recognize that teaching and learning are interdependent processes. Further, regularities in both teaching and learning are affected by additional factors such as unique characteristics of subject matter and environment.

Perhaps the most obvious reason for the knowledge scarcity is the meager amount of research and development that has been undertaken. Most of today's social complexities have been stimulated by significant advancements in technological knowledge. Massive investments in research and development have produced improved knowledge in areas like communications, agriculture, defense, medicine, and transportation. But while the investments in these fields have brought tremendous technical

advances, they have also brought serious problems of social regulation.

As social problems grow in magnitude, society necessarily looks to a better educated citizenry for solutions. But no state supports social science research and development at a level comparable to investment in technological development. Social knowledge cannot keep pace with a society's growing problems unless investments in social science inquiry begin to approximate investments in technological research.

The field of education in general, and of teaching in particular, presents a clear example of the discrepancy. Changing social, political, and economic forces are creating unprecedented problems for America's schools. Students and teachers alike, in primary and secondary schools as well as in colleges of education, must be increasingly informed and capable if we are to sustain our democratic and technologically-advanced state. Yet the amount of instructional time remains stable. Public school personnel are expected to teach more knowledge to more diverse groups of students in the same amount of time as before. Steps must be taken to help teachers respond to this difficult and challenging set of tasks through improved programs of research in the social sciences and education.

As the United States has increased its supports for social research and development, inquiry in education has been stimulated. A number of educational research and development centers were established by the United States Office of Education in the 1960s. The federal government went further and created a National Institute of Education (NIE) in 1972 to encourage even more comprehensive and rigorous educational research. Research in areas like learners and learning, the institutional effects of schooling, student achievement and its measurement, and more recently, the teaching process, itself, has received increased political attention

and financial support. Recent insights from studies of teaching, combined with increased encouragement for the work, now hold promise for important breakthroughs in the field.

A Brief History of Research on Teaching

Teaching has been a topic of scholarly thought and deliberation for centuries, but it has only been the subject of empirical research for less than 75 years. For the most part, the early empirical research would be more appropriately described as research on teachers, rather than research on teaching. These early efforts were largely directed at attempts to identify personal qualities and characteristics of apparently effective or ineffective teachers.

A typical study compared personal characteristics of teachers (e.g., their knowledge of the subject matter, concern for children, organizational abilities, etc.) with ratings of their perceived ability to teach (made by persons in a position of authority, such as principals or supervisors). Few significant correlations were reported. Nevertheless, this approach has such logical appeal (and perhaps simplistic beauty) that it dominated the study of teaching for the first half of this century.

The lack of success was consistently attributed to weaknesses in the instruments and design used for data collection. It was not until David Ryans (1960) completed a massive, extremely thorough, and elegant study of teacher characteristics and still obtained insignificant results that the research community began to recognize that perhaps the weakness was not that of instrumentation or method, but rather was intrinsic to the research paradigm itself. The long search for the personal qualities and characteristics of "the good teacher" thus diminished, with only meager insights gained from the efforts.

During this time, the efforts undertaken to study teaching were small compared with those undertaken to study learning. For the most part, the idea of empirically-based theories of instruction only began to receive serious consideration around the middle of this century. Educational researchers such as Jerome Brunner (1966) and N.L. Gage (1964) began to realize that results of research on learning would not have direct, immediate, and obvious implications for teaching. Teachers, like students, are not inanimate objects; they are continuously learning through interactions with students, other professionals, and the school environment, itself. The dynamic and unique qualities of teaching were recognized, as well as the interdependent nature of the teaching and learning processes. Thus, the need to study both these human activities (i.e., teaching and learning), concomitantly and intensively, began to emerge more clearly.

An additional factor supporting more intense study of teaching occurred in the 1960s. Following the Soviet launching of Sputnik, teachers in the United States became primary scapegoats for the "second-rate" status of American technology. Scientists were hired to develop instructional programs for school children that would enable even the "worst teacher" to succeed in getting students to master desired learnings. These efforts to develop "teacher proof" curricula, however, were not particularly successful. Somehow, teachers did make a difference to student learning, though no one knew how. Disenchantment with "teacher proof" programs led to increased awareness of the teacher's importance. This recognition led to growing support for the study of education in general and of teaching in particular. The first federal research centers and educational development laboratories were established at this time.

During the 1950s and 1960s a new approach had emerged to the study of teaching. Researchers such as Marie Hughes (1959), Bunnie Smith (Smith & Meux, 1960), Ned Flanders (1961), Arno Bellack (Bellack & Davitz, 1963), Hilda Taba, (Taba & Elzey, 1964), and others decided that it was important to enter the classroom directly to document teaching as it actually occurred. This was in obvious contrast to most earlier studies of teacher characteristics as interpreted by tests, surveys, and ratings made independently of carefully documented teaching activity.

Thus a resurgence of hope and enthusiasm characterized the 1960s and early 1970s. Perhaps the actions and activities of effective teachers could be adequately identified and described, even though their personality traits or characteristics apparently could not. Furthermore, it was reasoned, teachers could be taught to use those instructional actions and activities identified as effective in helping students learn (Dunkin & Biddle, 1974).

The major problems confronting researchers at this time were deciding which of the many teacher actions should be described, and what criteria and measures would best indicate effectiveness. Researchers responded to the first problem in a variety of ways. The logic of teachers' discourse was described and analyzed, as was the linguistic meaning of the discourse. Many studies examined teachers' questioning behavior -- for example, the number and types of questions asked, the level of thought likely to be provoked by the questions asked, if and how often questions were repeated, and the length of time teachers gave students to respond to questions. Verbal behavior was emphasized because it was apparently important to teaching and because it was easy to measure. Teacher talk was studied intensively, as was the amount of teacher talk compared to the amount of student talk.

A number of studies ventured into the non-verbal areas. Some examined the amount of teacher movement around the classroom, while others described the teacher's position in relation to the students, the teacher's facial expressions, how much and how often the teacher looked around the classroom, the non-verbal signals given to students during lessons, and much more.

Audio- and videotape recordings were used to describe a great variety of behaviors, and both sign and category instruments were used for systematic documentation. Researchers selected preconceived behaviors they judged important, formed categories for them, and counted each instance of occurrence (a category instrument). The sign instruments noted if the selected behaviors occurred over a given time span. Many instruments were constructed and used (see Simon & Boyer, 1970).

The problem of how to describe teacher actions received much greater attention than the problem of selecting and measuring valid criteria for effectiveness. This neglect resulted in the use of student scores on existing standardized achievement tests as the primary criterion for judging the effectiveness of teacher behaviors. There were, of course, exceptions to this general rule. Some researchers used paper and pencil tests of knowledge they constructed themselves. Others measured changes in student disruptive behavior or in the quality of students' verbal responses. For the most part, however, growth in student knowledge as indicated by average gains on written standardized tests was the most popular criterion measure.

The results of this research remained disappointing. When factors such as students' initial ability were accounted for, the described teacher behavior did not appear to affect student learning. In the preface

to The Second Handbook of Research on Teaching, a project of the American Educational Research Association, Travers (1973) expressed the following disappointment: "Those who participated in the first Handbook would never have guessed that, a decade later, authors of the Second Handbook would be having even greater difficulty in finding significant research to report than did their predecessors." (p.vii-viii)

Refinements in instrument development, data collection, and statistical analysis began gradually to change this trend by the mid 1970s (see Good, Biddle, & Brophy, 1975). Researchers turned their attention to more promising variables and developed means of capturing considerably more information about complex events occurring in the classroom. They studied learner characteristics and contextual variables (e.g., subject matter, classroom organization) which interacted strongly with the instructional behavior of teachers. Nevertheless, although the findings were far more enlightening, they continued to be either too general or of limited practical value to teachers or teacher educators. The following findings should illustrate this point:

Teachers who allow idleness and boredom to develop in their students have more discipline problems. (Kounin, 1970)

Teachers' enthusiasm relates to student learning and liking of the subject-matter. (Rosenshine & Furst, 1971)

After asking a question, allowing students more time to think before answering elicits a higher quality response. (Rowe, 1974)

The more time teachers keep students engaged in actual study of a subject, the more students learn. (Wiley & Harnischfeger, 1974)

There is great variation in the amount of time teachers keep students attending to different subject matters and different subject matter areas. (Berliner, 1975)

Students working in groups achieve more under the supervision of a teacher than if there is no teacher supervision. (Soar, cited in Rosenshine, 1976)

Calling on children in sequential, rather than in random order for reading groups facilitates students' attention and learning. (Brophy & Evertson, 1976).

These illustrations are not meant to denigrate research on teaching efforts to date. Indeed, the promise shown by the more recent work led to an organized plan to introduce further support to the research effort on the study of teaching.

Toward a Systematic National Effort

Recognizing that only meager support and small numbers of scholars had been available to the field of research on teaching, Garry McDaniels of the National Institute of Education (NIE) initiated a planning conference in 1974. The purpose of the conference was to consider what had already been accomplished in research on teaching and to make recommendations for future inquiry. N. L. Gage planned the conference, contacting broadly-experienced scholars and practitioners from across the nation. Ten panels were organized, each around a topical research focus. Each panel subsequently recommended a set of research programs to advance the field of research on teaching. The reports were compiled for NIE, and in 1975 NIE called for proposals for a major research center. It was to be the first center established by NIE since its founding in 1972 and was based on the panel report that emphasized a better understanding of the mental life of teachers (Shulman, 1975). A contract for the Institute for Research on Teaching was eventually awarded to Michigan State University in 1976. Subsequent research programs fostered by NIE have similarly flowed from the recommendation of other panels.

The Institute for Research on Teaching has undertaken three major missions: (1) It conducts inquiries on teaching that emphasize information-processing research; (2) It offers research training and thus prepares new scholars to engage in this area of needed inquiry; and (3) It serves as a communications center for documentation and deliberation on national and international research being conducted on teaching. Now entering its third year of operation, the Institute for Research on Teaching is seriously attempting to address problems and issues that have been troublesome or unattended by earlier research efforts, while maintaining close contact with other research centers pursuing valuable work in this field. Current investigations of teaching are characterized by more complex research paradigms, more sophisticated methods of inquiry, and greater diversity of professionals cooperating in the research process. A description of the problems and promise of these endeavors follows.

More Comprehensive Research Paradigms

As mentioned previously, the earliest research-on-teaching paradigm focused on the personal characteristics of teachers, while the next emphasized classroom teaching behavior. Each approach tended to produce weak results in terms of demonstrated effects on student learning, although studies of teacher behavior were far more promising. Some studies undertaken in the late 1960s and early 1970s began to examine more complex sets of variables and produce more stable and useful findings. The most promising studies acknowledged the influence and interaction of teacher judgments, as well as numerous other intervening variables, on the related processes of teaching and learning.

One problem with the earlier teacher behavior research paradigm was that it only asked "which" teacher behaviors were related to pupil outcomes. The underlying strategy was to identify teacher actions that distinguished superior from inferior teachers. The knowledge gained, in turn, was to become the basis for improvements in teacher education. A major fallacy of this paradigm, however, was its overemphasis on the identification of skills and/or performances that affect pupils. While teachers must, in fact, perform skillful actions, how they decide when, where, with whom, to what degree, and under what conditions to take certain critical actions is at least as important.

The critical relationship between teachers' mental processes and effective teaching had been noted in earlier conceptual and theoretical literature (Coladarci, 1959; Turner & Fattu, 1960; McDonald, 1965; Fattu, 1965; Shavelson, 1973). The mental processes viewed as important were referred to as teacher problem solving and decision making. Shavelson (1973) characterized them as "basic teaching skills" and Harootunian (1966) urged that we study the permanent and available intellectual equipment which the teacher brings to bear on the educational situation he or she faces.

Though there were some early empirical studies of teaching as decision making (Ward, 1966; Henderson/Lanier, 1967; Shulman, Loupe, & Piper, 1968), decisions and information processing that comprise teachers' intellectual functioning had been largely ignored by scholars doing research on teaching. A breakthrough occurred when researchers began to examine the determinants and consequences of teachers' expectations of students' academic abilities (Rosenthal & Jacobson, 1968; Brophy & Good, 1974). Although the earlier work was subject to serious

criticism, significant results were obtained, and it was established unequivocally that teacher expectations affected instructional decisions and ultimately, student performance (Good & Brophy, 1977).

Thus, in focusing on the mental life of teachers, the research paradigm at the Institute for Research on Teaching is building on successful earlier research. A more comprehensive research paradigm emerges from consideration of teachers' thoughts and feelings during instruction and instructional design, in combination with characteristics and behaviors.

Another feature of the new paradigm emanates from findings that effective teacher behaviors (teacher actions that were correlated significantly with pupil gain scores) differ across types of student and types of instructional goal. Brophy and Evertson (1974) found that the age and level of students' cognitive development (and their economic background) made a difference in what could be identified as effective teacher behavior. Following the teacher's demonstration of a new skill, for example, students from low income homes performed better when the teacher provided immediate group opportunity for skill practice before assigning seatwork. Students from middle and high income families did better with a single skill demonstration followed by immediate assignment to seatwork.

Thus researchers realized that few principles of effective teacher behavior would generalize across student ages, developmental levels, and economic background, or across subject matters, subject matter units, and types of learning. The search for such general rules was an effort to find something that apparently did not exist. Future studies of teaching should profit from these insights, taking into account the other critical factors that necessarily interact with the products and processes

of teaching. At a minimum, four major commonplaces of teaching should be considered in research. These commonplaces, identified by Joseph Schwab (1962), include: (1) the teacher, with particular knowledge, skills, and propensities; (2) the particular learners; (3) the subject matter being taught; and (4) the milieu in which the instruction and instructional design occurs.

Any particular empirical study of teaching must necessarily focus on certain features and neglect others. How can researchers attend to any part of the interrelated features of teaching without losing sight of the whole?

At the Institute for Research on Teaching, one strategy for handling a paradigm of this complexity has been to select one aspect of a given commonplace for focus (foreground) in any particular research program, then actually monitor the remaining commonplaces as background. An illustration of this strategy is the IRT study of Teachers' Conceptions of Reading. Here, teacher conceptions and instructional practices within a particular subject matter are studied as they are influenced by learner characteristics such as class composition and milieu characteristics such as school mandates.

More Diverse Research Methods and Professional Personnel

The use of more comprehensive research paradigms in the study of teaching calls for the application of various methods of inquiry and the collaboration of diverse sets of professionals. This need also makes research on teaching more difficult and complex than in the past.

Historically, the study of teaching has been dominated by a psychological perspective. Since most of the researchers have been educational psychologists by training, such an emphasis is understandable. Naturally there have been and still are exceptions to this general rule, but it has been unusual for a philosopher, sociologist, political scientist, or an economist to select teaching as his or her field of inquiry.

The new approaches and directions initiated by interdisciplinary research are naturally accompanied by diverse research methods and techniques. In addition to traditional observation and survey instruments, researchers on teaching now employ ethnographic methods, in-depth interviews, stimulated recall (which uses teacher responses to videotape recordings of teaching), and simulated problem situations to "capture the policies" of teachers' judgments. These techniques and others are used both in laboratory and classroom settings. By fostering a greater respect for diversity in method and technique, interdisciplinary collaboration should help research on teaching achieve the flexibility it needs as a growing discipline devoted to the study of a complicated human process.

Concluding Remarks

Despite the limited investments in past research on teaching, current research efforts indicate that we can be optimistic about the future. Present efforts are characterized by some new and promising features: increasingly complex research paradigms that not only address teaching behaviors but also teacher thinking during instruction and instructional design; a greater diversity of professionals cooperating in research; and new, more sophisticated models and methods of inquiry. These features,

combined with increased financial and social investments in educational research, should result in research findings and knowledge that further the field and can be used by teachers, teacher educators, and makers of educational policy.

It has been realized that there is little merit in searching for the good teacher or simply for the effective teaching behaviors. What constitutes effective teaching will differ as a function of variations in teachers, learners, resources, and the school and community environment. The search for regularities among these many complex parts of a complex social system has only begun.

So much is new in studying teaching -- new paradigms, new methods, new personnel, and new partnerships. The field is an exciting one and especially well suited to persons who have a healthy appetite for adventure and diversity.

References

- Bellack, A. A., & Davitz, J.R., in collaboration with Kliebard, H.M., & Hyman, R.T. The language of the classroom: Meanings communicated in high-school teaching. New York: Teachers College, Columbia University, U.S. Office of Education, Cooperative Research Project No. 1497, 1963.
- Berliner, D.C. The Beginning Teacher Evaluation Study: Overview and Selected Findings, 1974-1975. San Francisco: Far West Laboratory for Educational Research and Development, November, 1975.
- Brophy, J., & Evertson, C. Learning from teaching: A developmental perspective. Boston: Allyn & Bacon, 1976.
- Brophy, J.E., & Good, T.L. Teacher-student relationships: Causes and consequences. New York, Holt, Rinehart & Winston, 1974.
- Bruner, J.G. Toward a theory of instruction. Cambridge: The Belknap Press of Harvard University Press, 1966.
- Coladarci, A.P. The teacher as a hypothesis-maker. California Journal for Instructional Improvement, 1959, 2, 3-6.
- Dunkin, M.J., & Biddle, B.J. The study of teaching. New York: Holt, Rinehart & Winston, 1974.
- Fattu, N.A. A model of teaching as problem solving. In Theories of Instruction. Washington, D.C.: Association for Supervision and Curriculum Development, 1965.
- Flanders, N. Analyzing teacher behavior. Educational Leadership, 1961, 19, 173-75.
- Gage, N.L. Theories of teaching. In E.R. Hilgard (Ed.), Theories of learning and instruction: The sixty-third yearbook of the National Society for the Study of Education (Part I). Chicago: University of Chicago Press, 1964.
- Gage, N.L. (Ed.) The psychology of teaching methods: The seventy-fifth yearbook of the National Society for the Study of Education (Part I). Chicago: University of Chicago Press, 1976.
- Good, T., Biddle, B., & Brophy, J. Teachers make a difference. Holt, Rinehart & Winston, 1975.
- Good, T.L., & Brophy, J.E. Educational psychology: A realistic approach. New York: Holt, Rinehart & Winston, 1977.

- Harootunian, B. The teacher as problem solver: Extra-class decision-making. Paper presented at the 50th annual meeting of the American Educational Research Association, Chicago, February 1966.
- Henderson/Lanier, J.E. Teaching in the inner city: Identification of instructional practices of elementary teachers of culturally deprived youth. East Lansing, Michigan: Michigan State University, Education Publication Services, 1967.
- Hughes, M. Development of the means for the assessment of the quality of teaching in elementary schools (Project No. 353). Cooperative Program of the Office of Education, U.S. Department of Health, Education, and Welfare, University of Utah, 1959.
- Kounin, J. Discipline and group management in classrooms. New York: Holt, Rinehart & Winston, 1970.
- McDonald, F.J. Educational psychology. Belmont, Calif.: Wadsworth, 1965.
- Rosenshine, B. Classroom instruction. In N.L. Gage (Ed.), The psychology of teaching methods: The seventy-fifth yearbook of the National Society for the Study of Education (Part I). Chicago: University of Chicago Press, 1976.
- Rosenshine, B., & Furst, N. Research in teacher performance criteria. In B.O. Smith (Ed.), Research in teacher education: A symposium. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1971.
- Rosenthal, R., & Jacobson, L. Pgymalion in the classroom: Teacher expectation and pupils' intellectual development. New York: Holt, Rinehart & Winston, 1968.
- Rowe, M.B. Wait-time and rewards as instructional variables, their influence on language, logic and fate control. Part I: Wait-time. Journal of Research on Science Teaching, 1974, II, 81-94.
- Ryans, D.G. Characteristics of teachers. Washington, D.C.: American Council on Education, 1960.
- Schwab, J.J. The teaching of science as enquiry. In J.J. Schwab & P.F. Brandwein (Eds.), The teaching of science. Cambridge, Mass.: Harvard University Press, 1962.
- Shavelson, R.J. What is the basic teaching skill? Journal of Teacher Education, 1973, 24, 144.
- Shulman, L.S. (Chairperson). Teaching as clinical information processing: Panel 6 Report. In N.L. Gage (Ed.), NIE Conference on studies in teaching. Washington, D.C.: National Institute of Education, 1975.
- Shulman, L.S., Loupe, M.J., & Piper, R.M. Studies of the inquiry process: Inquiry patterns of students in teacher-training programs (Final Rep., Proj. No. 5-0597). East Lansing, Michigan: Michigan State University, 1968.

- Simon, A., & Boyer, E.G. Mirrors for behavior II: An anthology of observation instruments (Vols. A & B). Philadelphia: Classroom Interaction Newsletter, Research for Better Schools, Inc., 1970.
- Smith, B.O., & Meux, M. A study of the logic of teaching. Project No. 258 (7257) of the U.S. Office of Education, Department of Health, Education, and Welfare. Urbana: Bureau of Educational Research, 1960.
- Taba, H., & Elzey, F.F. Teaching strategies and thought processes. College Record, 1964, 65 (6), 524-538.
- Travers, R.M.W. (Ed.) Second handbook of research on teaching. Chicago: Rand McNally & Company, 1973.
- Turner, R.L., & Fattu, N.A. Problem solving proficiency among elementary teachers I. The development of criteria. U.S. Department of Health, Education, and Welfare, Office of Education, Cooperative Research Project No. 419. Bloomington: Institute of Educational Research, Indiana University, 1960.
- Ward, T.W. Professional integration and clinical research. In J. Raths & R.R. Leeper (Eds.), The Supervisor: Agent for change in teaching. Washington, D.C.: Association for Supervision and Curriculum Development, NEA, 1966.
- Wiley, D.E., & Harnischfeger, A. Explosion of a myth: Quantity of schooling and exposure to instruction, major educational vehicles. Educational Researcher, 1974, 3, 7-12.