HANDBOOK OF RESEARCH ON TEACHING

Third Edition

A PROJECT OF
THE AMERICAN
EDUCATIONAL RESEARCH
ASSOCIATION

Edited by
Merlin C. Wittrock

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Preface

Research on teaching has flourished since the publication of the *Second Handbook of Research on Teaching*. Since then, traditional lines of inquiry matured and emerging areas of research evolved. These old and new areas of research led to chapters in the third edition that have no counterparts in the two earlier editions of the *Handbook*. In addition, methods for studying, observing, and analyzing teaching and thought processes of learners grew and developed. From these areas of study and methods of research came data that added to our knowledge about teaching and to our interpretations of familiar concepts. In addition to these empirical advances, important conceptual approaches opened lines of inquiry that led to an understanding of the cognitive processes of teachers and learners that mediate the effects of teaching upon student achievement. These recent advances in empirical research, combined with improved conceptualizations, advanced our understanding of teaching and our ability to explain and to demonstrate how teaching can be improved.

Historical Notes

These strong statements about data, methods, and conceptualizations of research, especially about the significance of research on teaching, indicate progress made since the publication of the last edition of the *Handbook*. In the preface to the *Second Handbook of Research on Teaching*, Robert Travers discussed his disappointment in the lack of advance in substantive knowledge about teaching. He described the difficulty chapter authors had in finding significant research to report in the *Handbook*, a difficulty even greater than that encountered by the chapter authors of the first edition of the *Handbook of Research on Teaching*. He also mentioned that the research on teaching was often not cumulative across areas of study or even within an area, lacking the coherence of integrative theories and models of teaching.

On a more positive note, Travers discussed the then new areas of research on teaching that offered promise. He mentioned the technology of classroom management. He wrote also of the influence of educational sociology, and of the contributions of the following areas of study. Behavior modification was beginning to affect teaching. Piagetian concepts about learning were also beginning to make their way into research on teaching. The study of preschool educational programs offered significant findings and promise, as did the research on computer assisted instruction.

At the time he wrote, the young field of research on teaching was growing rapidly. Theories of teaching were attempting to catch up with it, organize it, and develop conceptualizations and models of it. Dunkin and Biddle's influential book, *A Study of Teaching*, was soon to be published. Process–product research on teaching was the dominant research program. Programmed instruction was a popular instructional technique, and behavioristic models of learning were the most common conceptualizations of how teaching influenced achievement. The study of cognition had not yet made much impact on research on teaching.

Recent Advances in Research

In the *Handbook of Research on Teaching, Third Edition*, none of the chapter authors had difficulty in finding significant work to report either in substantive areas or in the methodologies of research. Some of the significant research they report occurs in areas that have no analogues in chapters of the earlier editions of the *Handbook*. The chapter "Teachers' Thought Processes," for example, reports data and a conceptualization of teaching that emphasize how teachers' thoughts mediate between classrooom processes and student behaviors. Most of the work in this area began in 1973.

Another chapter, "Students' Thought Processes," also has no parallel in the earlier editions of the *Handbook*. In this chapter, research on student cognitive and affective processes, such as attention, motivation, and comprehension, offers new interpretations of teaching processes, such as practice, time-on-task, teacher praise, reinforcement, and the active role of learners in constructing meaning from classroom teaching. For example, teacher praise seems to influence the attention of many students in the classroom. By observing one child being rewarded, many students learn the teachers' objectives and intentions. From the study of student attributional processes, reinforcement seems to function, not automatically, but primarily when learners attribute it to their own activity. Research on learning from text and on reading and writing indicates that comprehension involves students actively building relations between knowledge or experience and the text.

Other chapters report related data and models. The chapter "The Teaching of Learning Strategies" discusses the mental processes learners use to remember and to understand information and subjects taught in school. The chapter on teaching in the armed forces introduces research on intelligent computer-assisted instruction, including beginning attempts to model or simulate learning using the computer to represent our knowledge about a learner's responses to teaching. In the chapter on mathematics learning, which is, of course, not a new chapter topic, research on learner's strategies of adding and subtracting is described and used to imply how teaching might be improved using this knowledge. The chapter on written composition studies related processes and their implications for the teaching of writing.

In the section on theory and methods of research on teaching, methodological advances are presented. In the chapter "Measurement of Teaching," for example, the authors present methods for measuring students' and teachers' thought processes. In the chapter on quantitative methods, sophisticated techniques of multivariate analyses of teaching are summarized. In the chapter "Qualitative Methods in Research on Teaching," we read about the influence of anthropology upon the methods of research on teaching. Last of all, the newly emerging programs and paradigms of research on teaching are discussed in the first chapter of the *Handbook*. This chapter on research programs provides an excellent introduction into the concepts and models that underlie the recent and encouraging progress in the research on teaching reported throughout the *Handbook*.

The Development of the Handbook

Frank Farley, President of AERA, asked me to edit the *Handbook of Research on Teaching, Third Edition*. With his advice, and after talking with numerous people in AERA, especially in the field of research on teaching, I nominated and President Farley appointed the *Handbook* Editorial Board: Marianne Amarel, Beverly Armento, David Berliner, Geraldine Clifford, Walter Doyle, Frank Farley, Gary Fenstermacher, Thomas Good, Reginald Jones, Richard Shavelson, and Lee Shulman. After several months of preliminary work, in August of 1981 this Editorial Board met for three days to design the *Handbook*, to set policies for its preparation, to suggest chapter authors, and to make recommendations about the obligations of the *Handbook* publisher.

Among the more important recommendations and policies of the Editorial Board were the following. First, the board suggested structuring the *Handbook* to best represent the advancing state of knowledge about teaching, including the incorporation of new chapters needed to reflect recent and important lines of inquiry. Second, the board asked me to appoint at least one, usually two, reviewers for each chapter. These reviewers, as do their counterparts in other AERA publications, would provide comments and feedback to the chapter authors from colleagues specializing in their same fields of research.

After the meeting of the Editorial Board, the authors of the *Handbook* chapters were promptly invited, as were the reviewers for each chapter. Each chapter author and each chapter reviewer was told that we had four objectives or intentions for each chapter. First, we wanted the chapter to include, but also to go beyond, the important function of summarizing or reviewing research, theories, and methods of research on teaching. We wanted chapter authors to emphasize a

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conceptual understanding of the research on teaching that will show the readers how the studies, theories, and findings relate to one another. We wanted to provide an integrated discussion of research.

Second, we wanted to convey what is known about research on teaching, and, where appropriate, what is known about teaching. Third, we wanted to provide useful theoretical explanations of the research findings. Fourth, we wanted to provide an organized coverage of the appropriate subject matter. All chapters were developed according to these criteria.

ACKNOWLEDGMENTS

The preparation of this *Handbook* involved excellent work by many people. I am greatly indebted to them for all of their contributions to the *Handbook*. I thank Frank Farley for his guidance in the planning of the *Handbook*. The members of the Editorial Board deserve full credit and special recognition for all of their contributions to the focus and structure of the *Handbook*, for their suggestions about the chapter authors and reviewers, and for the development of the policies that guided the preparation of this volume.

The chapter authors and the chapter reviewers, of course, deserve thanks for preparing the manuscripts that comprise the *Handbook*.

Anita King, Amy Shaunessey, and William Russell, of AERA, contributed to the preparation of the *Handbook* from its conception to its completion. Elyse Dubin and Charles Smith, of Macmillan Publishing Company, supervised the publication of the book. Elyse Dubin and her staff worked carefully, transforming the edited manuscripts into the finished volume.

I also want to thank people at UCLA, including Deans John Goodlad and C. Wayne Gordon for their support. Special thanks go to Christine Carrillo, Barbara Trelease, and Joyce Amslow for their help over several years with all the correspondence regarding the preparation of the *Handbook*, and to Nancy Wittrock for the many hours she donated to the editing of the *Handbook*.

Merlin C. Wittrock
Los Angeles, California

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Part 1

Theory and Method of Research on Teaching

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I.

Paradigms and Research Programs in the Study of Teaching: A Contemporary Perspective

Lee S. Shulman
Stanford University

Introduction and Overview

This is a chapter about alternatives. It deals with the alternative ways in which the women and men who study teaching go about their tasks. We conduct research in a field to make sense of it, to get smarter about it, perhaps to learn how to perform more adeptly within it. Those who investigate teaching are involved in concerted attempts to understand the phenomena of teaching, to learn how to improve its performance, to discover better ways of preparing individuals who wish to teach. This handbook presents the approaches and results of research on teaching, both to inform readers regarding the current state of theoretical knowledge and practical understanding in the field and to guide future efforts by scholars to add to that fund of understanding.

The purpose of this chapter is to serve as a reader's guide to the field of research on teaching, especially to the research programs that direct, model, or point the ways for research on teaching. The premise behind this chapter is that the field of research on teaching has produced, and will continue to yield, growing bodies of knowledge. But knowledge does not grow naturally or inexorably. It is produced through the inquiries of scholars—empiricists, theorists, practitioners—and is therefore a function of the kinds of questions asked, problems posed, and issues framed by those who do research. To understand the findings and methods of research on teaching, therefore, requires that the reader appreciate the varieties of ways in which such questions are formulated. The framing of a research question, like that of an attorney in a court of law, limits the range of permissible responses and prefigures the character of possible outcomes. Simply put, to interpret the findings of the many studies summarized in this volume, it is essential that the reader understand the questions that have been asked and the manner in which those questions have been framed, both conceptually and methodologically. Research on teaching, like most other fields of study, is not the work of individual scholars working alone and idiosyncratically. Indeed, most research is conducted in the context of scientific communities, "invisible colleges" of scholars who share similar conceptions of proper questions, methods, techniques, and forms of explanation. To understand why research is formulated in a particular fashion, one needs to locate the investigation among the alternative approaches to inquiry that characterize a field. A goal of this chapter will be to describe the diverse communities of scholars, practitioners, and policymakers that comprise, or in whose interests are defined, the activities and universe of research on teaching.

The term most frequently employed to describe such research communities, and the conceptions of problem and method they share, is *paradigm.* The term has been used in several ways. In his chapter "Paradigms for Research on Teaching" prepared for the first *Handbook of Research on Teaching* under his editorship, Gage referred to paradigms as "models, patterns, or schemata. Paradigms are not theories; they are rather ways of thinking or patterns for research that, when carried out, can lead to the development of theory" (Gage, 1963, p. 95). Writing during the infancy of this field of research, Gage drew most of his models from psychology or other behavioral sciences, rather than from the study of teaching itself. He was describing how models might be used in the study of teaching, not how they had already been employed. An important sign of the vigor of the field Gage was then fathering is the multiplicity of models from the study of teaching itself that we can now describe some

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The author thanks reviewers Richard Shavelson (U.C.L.A.) and N. L. Gage (Stanford University) and editorial consultants Walter Doyle and Marianne Amarel for their helpful suggestions.

twenty years later. More recently, Doyle (1978; 1983) has written lucidly on the paradigms for research on teaching.

The most famous use of "paradigm" is that of Thomas Kuhn, whose *Structure of Scientific Revolutions* (1970) is a classic of contemporary history of science that has become part of the common parlance and prevailing views of nearly all members of the social and natural science communities. Since one of his friendliest critics (Masterman, 1970) identified some twenty-two different uses of "paradigm" in Kuhn's book, I will refrain from attempting a succinct definition at this point. I prefer to employ the concept of a research program (Lakatos, 1970) to describe the genres of inquiry found in the study of teaching, rather than the Kuhnian conception of a paradigm. Nevertheless, the two terms are used interchangeably in most of the chapter.

The argument of this chapter is that each of the extant research programs grows out of a particular perspective, a bias of either convention or discipline, necessarily illuminating some part of the field of teaching while ignoring the rest. The danger for any field of social science or educational research lies in its potential corruption (or worse, trivialization) by a single paradigmatic view. In this manner, the social sciences and education can be seen as quite different from Kuhn's conception of a mature paradigmatic discipline in the natural sciences, which is ostensibly characterized by a single dominant paradigm whose principles define "normal science" for that field of study.

I will therefore argue that a healthy current trend is the emergence of more complex research designs and research programs that include concern for a wide range of determinants influencing teaching practice and its consequences. These "hybrid" designs, which mix experiment with ethnography, multiple regressions with multiple case studies, process-product designs with analyses of student mediation, surveys with personal diaries, are exciting new developments in the study of teaching. But they present serious dangers as well. They can become utter chaos if not informed by an understanding of the types of knowledge produced by these different approaches. However, the alternative strategy that reduces the richness of teaching to nothing more than the atomism of a multiple variable design may be even worse. This chapter will thus discuss several alternative ways of thinking about "grand strategies" for research on teaching, for programs of research properly construed rather than individual, one-shot investigations.

The chapter will begin with a discussion of the general character of research programs or paradigms, those conceptions of problem and procedure that members of a research community share and in terms of which they pursue their inquiries and exercise their gatekeeping.

After examining the general conception of research programs, a synoptic map of research on the teaching field will be presented. In terms of that map, the various research programs that constitute the field will be described and discussed. This general model will be followed by detailed discussions of the dominant competing (and complementary) research programs currently pursued in the study of teaching.

The next section will discuss the prospects for this field of study, in light of its current progress and present dangers, and in the spirit of contemporary critiques of social science method and theory as exemplified in the work of Cronbach (1975; 1982). Finally, a set of recommendations and anticipations regarding future research programs will be presented. We begin with the matter of research programs or paradigms.

Paradigms and Research Programs

How should teaching be studied? Where does one begin? In what terms can questions be put? Although logically the range and diversity of answers to these questions is vast, in practice, any given scholar appears to operate within a fairly limited repertoire of alternatives. Thus, some researchers always begin with the assumption that their task is to relate, whether experimentally or descriptively, variations in the measured achievement or attitudes of pupils to variations in the observed behavior of teachers. Additional wrinkles may be added to the design — use of individual pupil data as against classroom mean scores, use of pupil- or teacher-characteristic data as mediating variables — but the fundamental character of the questions remains unchanged. Other scholars are equally focused on still other formulations, whether involving classroom discourse, teacher cognitions, the sense pupils make of instruction, or the social organization of classrooms via task or activity structures. Once committed to a particular line of research, the individual scholar seems rarely to stray from it. A research program has been adopted.

Within the terms of such a research program, we can expect that certain kinds of research will be deemed relevant, will be carefully followed and cited by the investigator. A community of like-minded scholars will likely develop, exchanging papers, citing one another's work, using similar language and sharing both assumptions and styles of inquiry. They will agree on the starting points for inquiry. What is problematic? What are sources of wonder or dismay? What are the key topics, the strategic sites, for research? What are the implicit definitions of schooling, of teaching, of learning? What are the units of analysis? What methods of observation and analysis are legitimate? As the answers to such questions evolve, usually without much explicit debate, a kind of paradigm may be inferred to have developed.

A word on paradigms is in order. The concept of a paradigm became part of the working vocabulary of social scientists under the influence of Thomas Kuhn (1970). In Kuhn's sense of the term, a paradigm is an implicit, unvoiced, and pervasive commitment by a community of scholars to a conceptual framework. In a mature science, only one paradigm can be dominant at a time. It is shared by that community, and serves to define proper ways of asking questions, those common "puzzles" that are defined as the tasks for research in normal science. Members of the community acknowledge and incorporate the work of perceived peers in their endeavors. Kuhn would expect members of such a group to be relatively incapable of communicating meaningfully with members of other communities. (Quite literally, the ability to *communi*cate is a central definer of *communi*ty membership.) Moreover, they would have difficulty comprehending why members of another paradigmatic community would find the particular puzzles they pursue of either importance or value.

A research program not only defines what can be legitimately studied by its advocates, it also specifies what is necessarily excluded from the list of permissible topics. For example, in their landmark *The Study of Teaching,* Dunkin and Biddle (1974) explicitly exclude certain kinds of research from their review. In doing so, they leave out all studies that do not employ quantifiable measures of process or product. Ironically, the work of Jackson (1968) in *Life in Classrooms* is explicitly left out of consideration, even though it is among the most frequently cited references in their conceptual analysis of teaching.

In examining the effects of paradigms on the activities of researchers, we should distinguish between two general ways in which the term can be employed. The first sense, that which Kuhn intended in his characterization of the history of physics and other natural sciences, limits a discipline to but a single dominant paradigm during any particular epoch. He reports (Kuhn, 1970, pp. vii–viii) that he was drawn to that view during a year spent at the Center for Advanced Study in the Behavioral Sciences when, for the first time, he found himself in extended colleagueship with a community of social scientists. He observed that they seemed to argue, even when from the same discipline, about basic matters of theory and method that physical scientists tended to take for granted. It was then he realized that they failed to share a common conception of their fields so characteristic of the more "mature" disciplines. He called that network of shared assumptions and conceptions a paradigm, and concluded that the social sciences were, therefore, "preparadigmatic" in their development.

There is a second, weaker sense of paradigm I prefer to use in this chapter. Social scientists pursue their research activities within the framework of a school of thought that defines proper goals, starting points, methods, and interpretive conceptions for investigations (see Schwab, 1960/1978). These schools of thought operate much like Kuhnian paradigms or Lakatosian research programs insofar as they are relatively insular and predictably uniform. However, in no sense are social science fields necessarily dominated by a single school of thought. Indeed, as Kuhn observed, what distinguishes the social from the natural sciences is this very absence of a single dominant paradigm.

Where Kuhn erred, I believe, is in diagnosing this characteristic of the social sciences as a developmental disability, a state of preparadigmatic retardation. Indeed, it is far more likely that for the social sciences and education, the coexistence of competing schools of thought is a natural and quite mature state. In this matter, I agree fully with Merton's observations about sociology:

> The chronic crisis of sociology, with its diversity, competition and clash of doctrine, seems preferable to the ... prescription of a single theoretical perspective that promises to provide full and exclusive access to the sociological truth. ... No one paradigm has even begun to demonstrate its unique cogency for investigating the entire range of sociologically interesting questions. And given the variety of these questions, the past prefigures the future. (Merton, 1975, p. 28)

Merton argues for the superiority of a set of competing paradigms over the hegemony of a single school of thought. He asserts that theoretical pluralism encourages development of a variety of research strategies, rather than premature closure of investigation consistent with the problematics of a single paradigm. Different paradigms alert research workers to different phenomena of interest, different conceptions of problem, and different aspects of events likely to be ignored within a single perspective. He advocates the virtues of "a plurality of theoretical orientations ... in the form of a 'disciplined eclecticism'" (ibid., p. 51).

> The cognitive problems of coexisting paradigms call for discovering the capabilities and limitations of each. This involves identifying the kinds and range of problems each is good for (and noting those for which it is incompetent or irrelevant), thus providing for potential awareness of the respects in which they are complementary or contradictory. ... Many ideas in structural analysis and symbolic interactionism, for example, are opposed to one another in about the same sense as ham is opposed to eggs: they are perceptibly different but mutually enriching. (Merton, 1975, pp. 50, 31)

The philosopher of science Feyerabend (1974) puts the matter even more directly in his essay "How to Be a Good Empiricist: A Plea for Tolerance in Matters Epistemological":

> You can be a good empiricist only if you are prepared to work with many alternative theories rather than with a single point of view and "experience." This plurality of theories must not be regarded as a preliminary stage of knowledge which will at some time in the future be replaced by the One True Theory. (p. 14)

This is also the view of the present chapter regarding the proper treatment of the alternative research programs to be discussed presently.

Gage (1963) presented a comprehensive review of paradigms for research on teaching in the first *Handbook of Research on Teaching*, compiled under his editorship. He reviewed a host of exemplars of paradigms from other social sciences that might prove valuable for studies of teaching, then proceeded to explore those that had been used for research on classroom teaching itself. By far the most influential source of paradigms for the study of teaching came from psychology, especially the behavioristic, experimental, functional perspective within that discipline. He defined "criterion-of-effectiveness" paradigms that specified criteria for judging the success with which a teacher had performed his or her tasks and related that criterion to a variety of potential correlates to discern those that were most consistently and powerfully associated with achievement of the criterion.

Potential Correlates → Criterion of Effectiveness

Gage distinguished among several types of effectiveness criteria (and microcriteria, specific outcome variables rather than general ones) as well as types of design. He then discussed "teaching process" paradigms, where the emphasis of the research was on characterizing the observable teacher and student behaviors in the classroom as they related to measures of pupil growth. Summarizing across the several models of teaching process research, he found four common elements. These were (a) the perceptual and cognitive processes of the teacher, which eventuate in (b) action elements on the teacher's part. The teacher's actions are followed by (c) perceptual and cognitive processes on the pupil's part, which in turn lead to (d) actions on the part of pupils (Gage, 1963, p. 127).

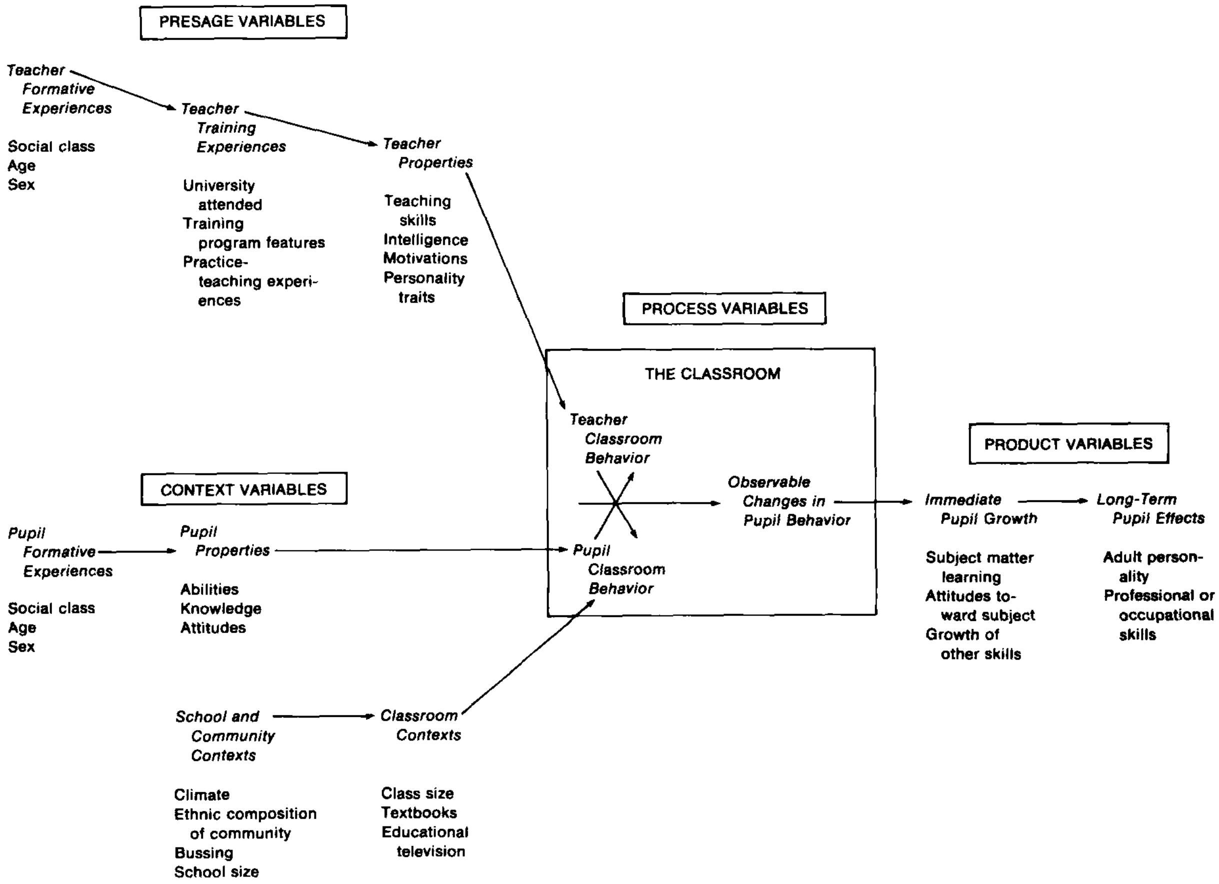
PRESAGE VARIABLES
Teacher Formative Experiences
Social class
Age
Sex
Teacher Training Experiences
University attended
Training program features
Practice-teaching experiences
Teacher Properties
Teaching skills
Intelligence
Motivations
Personality traits
PROCESS VARIABLES
THE CLASSROOM
Teacher Classroom Behavior
Observable Changes in Pupil Behavior
Pupil Classroom Behavior
PRODUCT VARIABLES
Immediate Pupil Growth
Subject matter learning
Attitudes toward subject
Growth of other skills
Long-Term Pupil Effects
Adult personality
Professional or occupational skills
CONTEXT VARIABLES
Pupil Formative Experiences
Social class
Age
Sex
Pupil Properties
Abilities
Knowledge
Attitudes
School and Community Contexts
Climate
Ethnic composition of community
Bussing
School size
Classroom Contexts
Class size
Textbooks
Educational television

Fig. 1.1. A model for the study of classroom teaching. From *The study of teaching* (New York: Holt, Rinehart, and Winston) by M. J. Dunkin and B. J. Biddle, 1974. Reprinted by permission.

It is somewhat ironic that in this important and early characterization of research paradigms, the cognitive and affective internal states of both learners and teachers are given equal weight with the observable actions of each. As the field continued to develop, the interest in those perceptual and cognitive states that are hypothesized to produce and mediate observable behavior waned. The dominant research program for the study of teaching combined a microcriterion of effectiveness (tested academic achievement) and teaching process correlates.

Gage recognized the limitations of these paradigms. He commented on the importance of classrooms as places where teachers must deal with more than one pupil at a time, a fact often ignored by then-extant models. He also observed that the unit of interaction connoted by those paradigms was typically the "single interact," ignoring the larger and more complex exchanges that constituted the important features of classroom process. On the other hand, it was important to begin the enormously difficult job of studying classroom behavior, and a number of simplifications were necessary. Those simplifications were provided by the early models and made possible the important first steps in the development of the field.

Some 10 years later, in *The Study of Teaching*, Dunkin and Biddle (1974) constructed a model for research on teaching based on an earlier formulation by Mitzel (1960). They posited four classes of variables: presage variables (teacher characteristics, experiences, training, and other properties that influence teaching behavior), context variables (properties of pupils, of the school and community, and of the classroom), process variables (observable actions of teachers and students in the classroom), and product variables (immediate and long-term effects of teaching on pupil growth intellectually, socially, emotionally, and the like).While it is unfair to characterize such a sophisticated and prescient work too simply, their formulation had an enormous impact on the field. The emphasis on studies relating processes to products did not begin with their reviews. But their book gave strong impetus to the process-product work and helped embed it in a more comprehensive theoretical matrix. Moreover, they provided the working vocabulary for those who followed to describe what they were studying and how they were going about it.

The next section shall present a more general model for research on teaching, reflecting changes in the field, both observed and needed, during the last decade.

A Synoptic Map of Research on Teaching

In asserting that no single research program can capture the full set of educational events, I imply that the insufficiencies of particular programs can be overcome through proper blending with the insufficiencies of other programs. This image of a yoking of inadequacies to produce a hybrid more vigorous than either of its parents is certainly not alien to the practice of agriculture, but it has not been widely touted in the social sciences.

Two matters can be mentioned at this juncture. First, while most disciplines or fields of study become identified with narrowly defined methods, others have developed traditions of eclecticism, a penchant for employing a variety of methods for both acquiring information and subjecting it to analysis and interpretation. Among the traditional disciplines, most prominent is history, whose activities are so diversely puzzling to many outsiders that there is often debate over whether history is more properly classified among the social sciences or the humanities. Yet it is, I shall argue, precisely because history so readily defies categorization (or so comfortably accepts multiple affiliation) that it may serve as a useful analogy for the kind of multiple paradigmatic inquiry I shall advocate in this chapter. Moreover, it manages its several faces while surviving as both a form of fundamental investigation and as a significant source of guidance for both policy and practice — at least for those who do not choose to ignore it.

I begin with the assumption that there is no "real world" of the classroom, of learning and of teaching. There are many such worlds, perhaps nested within one another, perhaps occupying parallel universes which frequently, albeit unpredictably, intrude on one another. Each of these worlds is occupied by the same people, but in different roles and striving for different purposes simultaneously. Each of these contexts is studied by social scientists and educators, becoming the subject of theoretical models and treatises. Each has its own set of concepts and principles and, quite inevitably, its own set of facts, for facts are merely those particular phenomena to which our questions and principles direct our attention.

We become involved in these different worlds as elements of our puzzle because we most often must make a particular level or strand the subject of empirical study, but then we attempt to infer properties of other strands from the one we have investigated. Thus, for example, we conduct studies of how individual students learn to perform certain complex school tasks, and then infer principles for the learning of similar tasks by groups of students. Similarly, we may study classrooms of youngsters and then use the data to recommend policy for a school or school district. The essence of the puzzle lies in recognizing that no benevolent deity has ordained that these parallel lives be consistent with one another, nor that the principles found to work at one level must operate similarly at others.

Indeed, I would contend that our most reasonable hypothesis is that each of these lives must be studied in its own terms. We must attempt to capture the essential features of each strand in one or more middle-range theories (Merton, 1967) which render accounts of the teaching-learning episodes that characterize that level. These episodes provide the dramatic material for lives in that context, and define the strategic research sites (Merton, 1959) within which we make theoretical sense of what occurs there. Since those strategic research sites are different in each strand, so must be the strategic investigations, hence the facts, principles, and theories that emerge from those investigations. It is unlikely that any single theoretical frame can encompass the diversity of sites, events, facts, and principles that cross all those levels.

Any claim that the worlds of teaching, of schools and classrooms, of pedagogues and pupils, are so complex that no single perspective can capture them should be treated with skepticism. Like our suspicions of the mythical sociologist who asserts that all generalizations are false, we must ask how the claim can be made. It is fashionable to recall the ancient image of the blind men who provide alternative portrayals of an elephant whose unseen bulk is not perceptible to any one of them. Yet that tale presupposes the talents of a sighted observer who possesses knowledge of the total pachyderm and can thus grasp the futility of each assessment from the blind inquirers. Likewise in a field of scholarship, the observer who claims to possess precisely the kind of knowledge that he asserts is, in principle, unavailable to his fellows makes a claim we must find suspect. For those who conduct research on teaching are not blind, and relative to my fellow scholars I can claim no special gift of insight.

Given that my rationality is as limited as anyone else's, I have attempted to piece together a more comprehensive portrayal of the field through incorporating reports arriving from many vantage points (or touching points, in the case of our metaphor). By combining these separate accounts of teaching from different families of researchers, accounts much like the tales of early mariners regarding the geographic wonders they encountered on their journeys, we can begin to fashion a broader picture of our phenomena.

This map, however, cannot be a comprehensive *theory* of teaching. It is a representation of the variety of topics, programs, and findings of the field of research on teaching, related to one another as usefully as possible. For it to be useful, we must attempt to construct a map of the full domain of research on teaching (or several alternative maps, each highlighting different features, analogous to political subdivisions, the physical features and elevations, climatic conditions, and the like), a map sufficiently broad and encompassing that we can locate upon it not only the particular sections of terrain well captured by particular programs but also those left out. Moreover, we must seek to construct maps that themselves have some coherence or order, so our analyses can go beyond a mere shopping list of topics *qua* ingredients, some of which just happen to be omitted from any one particular treatment.

The fundamental terms in my analysis are the primary participants — teacher(s) and student(s) — who may be studied as individuals or as members of a larger group, class, or school. Teaching is seen as an activity involving teachers and students working jointly. The work involves the exercise of both thinking and acting on the parts of all participants. Moreover, teachers learn and learners teach. Both those functions of each actor can be considered an essential part of the inquiry.

The potential determinants of teaching and learning in the classroom are the three significant attributes of the actors — capacities, actions, and thoughts. *Capacities* are the relatively stable and enduring characteristics of ability, propensity, knowledge, or character inhering in the actors, yet capable of change through either learning or development. *Actions* comprise the activities, performances, or behavior of actors, the observable physical or speech acts of teachers and students. *Thoughts* are the cognitions, metacognitions, emotions, purposes — the tacit mental and emotional states that precede, accompany, and follow the observable actions, frequently foreshadowing (or reflecting) changes in the more enduring capacities. Both thoughts and behavior can become capacities (in the form, for example, of knowledge and habits or skills).

The activities of teaching can take place in a number of contexts, "surrounds" which define, in part, the milieu in which teaching occurs — individual, group, class, school, community. Within each of these nested levels (See Barr & Dreeben, 1983a; 1983b), the two sorts of transactions that comprise classroom life are occurring. Two sorts of agendas are being followed, two sorts of curriculum are being negotiated. One agenda is the organizational, interactional, social, and management aspect of classroom life, sometimes dubbed the hidden curriculum, though its visibility has improved dramatically as it has been studied. The second band of transmission is the academic task, school assignment, classroom content, and manifest curriculum. The contents of these two agendas, these forms of pedagogical transmission, are at the very heart of the educational enterprise, because they define what schools are for, what purposes they are designed to accomplish. The dual general purposes of transmitting mastery of the contents of a curriculum, comprising many subjects, skills, and attitudes, and of socializing a generation of young people through the workings of the classroom community define the core of classroom life.

Since the events we are coming to understand occur in classrooms and schools, they invariably occur in the service of teaching *something*. That something is usually capable of characterization as the content of a subject (e.g., Shakespeare's *Hamlet*, quadratic equations, diagraming sentences, word-attack skills, Boyle's Law), a particular set of skills, strategies, processes or understandings relative to the subject matter, or a set of socialization outcomes. The content ought not be viewed as only a "context variable" (Dunkin & Biddle, 1974), comparable to class size or classroom climate. The content and the purposes for which it is taught are the very heart of the teaching–learning processes. Smith (1983) put it clearly when he asserted that the "teacher interacts with the student in and through the content, and the student interacts with the teacher in the same way" (p. 491). Although the content transmitted for particular purposes has rarely been a central part of studies of teaching, it certainly deserves a place in our comprehensive map, if only to remind us of its neglect.

Central to any discussion of content is the unit of instructional activity that serves as the starting point for analyses of teaching. Is it the individual interchange between student(s) and teacher, the episode (e.g., quelling a particular behavioral disturbance, or explaining a new concept), the lesson (say, a 20-minute reading group session), the unit (e.g., a six-day sequence on the Age of Jackson in a U.S. history course), the semester course, or the year of work? If it is a longer analytic unit, is it assumed to be decomposable into an aggregation of discrete interchanges or episodes, or is it dealt with as a totality in itself? These are certainly critical choices for the researcher. In addition, conceptions of content itself are important. These include those deriving from philosophers of education (e.g., the distinction between substantive and syntactic structures [Schwab, 1962/1978]), from instructional psychologists (e.g., facts, concepts, principles, cognitive strategies), or from cognitive psychologists (schemata, scripts, metacognitions, etc.).

Finally, the perspective taken by the research can be that of an outside observer attempting to discover the lawful relationships among the observable features, or the emphasis can be on discovering the meanings constructed by the participants as they attempt to make sense of the circumstances they both encounter and create. These two aspects are sometimes called the positivistic and the interpretive, or the *etic* and the *emic* (following the tradition in linguistics of distinguishing between phon*etic* and phon*emic* analyses).

The drawing of Figure 1.2 attempts to portray the relationships among these units of inquiry. Almost all research on teaching examines the relationships among features, be they capacities, actions, or thoughts as evidenced by the participants conceptualized in some fashion. Research programs differ in the particular features chosen for analysis, the direction of causality implied by the discussion (e.g., teacher → student; students → teacher; students ↔ teacher, reflexively or interactively caused joint behavior of students and teacher), the agendas to which they attend, the level of aggregation or context at which relationships are sought, and the perspective taken with respect to the activities or experiences of the participants.

Thus, for example, research in the tradition of teacher characteristics typically examined the relationships between indicators of teacher capacities (e.g., teacher test scores, years of experience, personality measures) and of student capacities (e.g., achievement test scores, attitudes toward self or school). At other times, teacher capacities were related to student actions (e.g., student ratings of course satisfaction).

The process–product tradition studies the relationships of teaching performance and subsequent student capacities. The Academic Learning Time program relates teaching performance to student actions, as inferred from the time allocations made by students. The student mediation program focuses on student thoughts and feelings, usually in relation to teacher actions and subsequent student actions or capacities. The teacher cognition program examines the relationships of teacher thought to teacher action (e.g., studies of judgment policies and teachers' assignments of pupils to reading groups). The classroom ecology program examines the reflexive influences of teacher and student actions, frequently illuminated by aspects of thought. Different patterns of interaction may subsequently be related to changes in students' capacities.

The study of teaching usually involves coming to understand the relationships, in the forms of causes or reasons, among these different aspects of teaching and learning. But such a model alone does not portray those research efforts. Different research programs for the study of teaching select different parts of the map to define the phenomena for their inquiries. There are also other sorts of choices that determine the manner in which research on teaching is conducted. These include predilections for qualitative as against quantitative research methods, disciplinary or interdisciplinary orientation, preference for the characterization of behavior as against the representation of thought — behaviorism versus mentalism, to use somewhat older terms — and, most broadly, the conception of one's craft as a science in search of laws or as an exercise of interpretation in search or meanings.

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