DOCUMENT RESUME

ED 266 109 SP 027 071

AUTHOR Clark, Christopher M.; Lampert, Magdalene
TITLE What Knowledge Is of Most Worth to Teachers? Insights from Studies of Teacher Thinking. Occasional Paper No. 86.
INSTITUTION Michigan State Univ., East Lansing. Inst. for Research on Teaching.
SPONS AGENCY National Inst. of Education (ED), Washington, DC.
PUB DATE Aug 85
CONTRACT 400-81-0014
NOTE 20p.; Paper presented at the Annual Meeting of the American Educational Research Association (69th, Chicago, IL, March 31-April 4, 1985).
PUB TYPE Viewpoints (120) -- Reports - Descriptive (141) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Classroom Techniques; *Cognitive Processes; Decision Making; *Educational Research; Interaction Process Analysis; *Research Utilization; *Teacher Behavior; *Teacher Effectiveness

ABSTRACT

The authors claim that the principal contribution of research on teacher thinking is enrichment of understanding of what teachers know and what teaching entails. Studies of teacher planning, decision making, knowledge, and theorizing can be used to provide prospective teachers with a realistically complex picture of the cognitive aspects of teaching. This research also supports the development of a conception of teaching as a reflectively professional enterprise. For both novices and experienced teachers the proposed goals of applying this research are to promote understanding of teaching as a design profession and to empower teachers in self-directed professional development efforts. Knowledge about how teachers get their work done is of worth to teachers not because it will provide them with new tools to use, but rather because it changes the way researchers view what teachers need to know; researchers can then be of more help to teachers. Descriptions of teaching that have been produced by studies of teacher thinking can help to provide a framework for researchers to decide what sorts of information, advice, and support will be useable in the classroom. (Author/JD)

Occasional Paper No. 86

WHAT KNOWLEDGE IS OF MOST WORTH TO TEACHERS? INSIGHTS FROM STUDIES OF TEACHER THINKING

Christopher M. Clark
and
Magdalene Lampert

Published By

The Institute for Research on Teaching
252 Erickson Hall
Michigan State University
East Lansing, Michigan 48824-1034

August 1985

This work is sponsored in part by the Institute for Research on Teaching, College of Education, Michigan State University. The Institute for Research on Teaching is funded primarily by the Program for Teaching and Instruction of the National Institute of Education, United States Department of Education. The opinions expressed in this publication do not necessarily reflect the position, policy, or endorsement of the National Institute of Education. (Contract No. 400-81-0014)

Institute for Research on Teaching

The **Institute for Research on Teaching** was founded at Michigan State University (MSU) in 1976 by the National Institute of Education. Following a nationwide competition in 1981, the NIE awarded a second five-year contract to MSU. 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.

Abstract

The authors claim that the principal contribution of research on teacher thinking is enrichment of our understanding of what teachers know and what teaching entails. Studies of teacher planning, decision making, knowledge, and theorizing can be used to provide prospective teachers with a realistically complex picture of the cognitive aspects of teaching. This research also supports the development of a conception of teaching as a reflectively professional enterprise. For both novices and experienced teachers the proposed goals of applying this research are to promote understanding of teaching as a design profession and to empower teachers in self-directed professional development efforts.

WHAT KNOWLEDGE IS OF MOST WORTH TO TEACHERS? INSIGHTS FROM STUDIES OF TEACHER THINKING[1]

Christopher M. Clark and Magdalene Lampert[2]

Research on teacher thinking has reached a stage of development at which it is fair to ask the challenging "So what?" question. Research on teacher planning, interactive decision making, teacher judgment, and teachers' implicit theories has made its way into the published literature of education, has been reviewed and synthesized (Clark & Yinger, 1977; Shavelson & Stern, 1981), and is the topic of a chapter in the forthcoming Handbook of Research on Teaching, Third Edition (Wittrock, in press). An AERA Special Interest Group on Teacher and Student Cognitions has been established, and the International Study Association on Teacher Thinking was founded in 1983 to foster communication in a worldwide network of educational researchers actively exploring thinking and decision making by teachers. Clearly, the study of teacher thinking has become a respectable and rewarding way for researchers to spend time and energy. But the question before us here is "What knowledge can be derived from this work that is of most worth to teachers?"

The answer to this question will be shaped to a great extent by how one understands the key terms "knowledge," "worth," and "teachers," as well as by underlying assumptions about the relationship between research and practice.

---

[1]This paper was presented at the annual meeting of the American Educational Research Association, Chicago, April 2, 1985.

[2]Christopher Clark is co-coordinator of the IRT's Written Literacy Forum and a professor of counseling, educational psychology and special education at MSU. Magdalene Lampert is coordinator of the Dilemma Management in Teaching Project and an assistant professor of teacher education at MSU.

Our view is that the role of research on teaching is to serve and understand practice rather than dictate to practitioners (see Clark, 1984, for a fuller exposition of the idea of research in the service of teaching). Therefore, we do not look to research on teacher thinking for procedural prescriptions for how teachers ought to think. Rather, the kind of knowledge from research on teacher thinking that we believe holds most potential worth for teachers is propositional knowledge, that is, knowledge about the mental lives of teachers directly derivable from descriptions of the way teaching is. To us, worthwhile knowledge from research on teacher thinking is that which supports the development of a conception of teachers as autonomous, self-directed professionals. "Teachers" includes undergraduate education majors, novices, experienced teachers, and teacher educators--the teachers of teachers.

Contributions of Research on Teacher Thinking

Research on teacher thinking has broadened and deepened our knowledge about teaching in three important domains: knowledge about the complexity of teaching, knowledge about what teachers know, and knowledge of methods of inquiry and reflection on teacher thinking.

Knowledge About the Complexity of Teaching

Teachers themselves know from experience that teaching is complex and demanding. A few scholars and researchers have written about it (e.g., Jackson, 1968; Lortie, 1973). More recently, researchers on teacher thinking have begun to describe how and why teaching is and feels so complex. We illustrate this by drawing on studies of teacher planning, of interactive decision making, and of the dilemmas that characterize teaching. This research probably says very little that is new to experienced teachers, but it is "of worth" to them to have their work more adequately described by scholars. The potential

exists for developing a way of thinking and talking about teaching that can enhance teachers' views of themselves as well as contributing to scholarly knowledge about the profession.

The literature of research on teacher planning consists of fewer than twenty-five primarily descriptive studies of the ways in which teachers deal with uncertainty and the often conflicting goals of teaching. A recent review (Clark & Peterson, 1984) indicates that there are as many as eight different types of planning that experienced teachers engage in during the course of the school year, and that these different types of planning are nested one within the other and interact in complex ways. The research also indicates that the relatively straightforward linear rational planning model does not describe the planning of experienced teachers. Rather, teacher planning seems to proceed in a cyclical and iterative fashion, in which problem representation, partial solutions, and mental trying out alternate until a workable plan results (Yinger, 1979).

Teacher planning is a major determiner of what is taught in schools. The curriculum as published is transformed and adapted in the planning process by additions, deletions, interpretations, and by teacher decisions about pace, sequence, and emphasis. And in elementary classrooms, where a teacher is responsible for teaching all subject matters, planning decisions about what to teach, how long to devote to each topic, and how much practice to provide take on additional significance and complexity. Other functions of teacher planning include allocation of instructional time for individuals and groups of students, composition of student groupings, organization of daily, weekly, and term schedules, compensating for interruptions from outside the classroom, and communicating with substitute teachers. Experienced elementary teachers

report that they spend between ten and twenty hours per week in planning activities, and much of that during non-school hours (Clark & Yinger, 1979).

Teacher planning is generally a solitary activity, and one for which there is relatively little institutional support. Yet planning, as described in the literature, seems central to the professional activity of teachers. Research on teacher thinking, through its descriptions of the functions, models, and sheer amount of teacher planning, provides us with a set of insights and the beginnings of a language in which to think about and explain how teaching may at once look simple yet feel and be very complex and demanding.

Researchers have also studied the thinking and decision making that teachers do during the act of teaching. This research has explored the extent to which teachers make on-the-spot decisions that change their plans or behavior in the classroom, and attempted to identify the cues used by teachers in reaching these interactive decisions. A few studies have explored the relationships between patterns of interactive decision making and student achievement, and some compare thinking processes of experts with those of novices in the same situations. Like the literature on teacher planning, the number of studies available is small, and the teachers studied are mostly experienced elementary school teachers.

Research on interactive decision making indicates that teachers encounter decision situations at two-minute intervals while teaching--literally hundreds of decision points per day. This research also indicates that the greatest proportion of teachers' interactive thoughts is about students (between 39% and 50%), followed by instructional behavior and procedures, content, materials, and learning objectives (Clark & Peterson, 1984). Marland (1977)

categorized teachers' interactive thoughts as perceptions, interpretations, anticipations, and reflections. There is some evidence to support the idea that teachers consider improvising major changes in instructional process primarily when their teaching is going poorly (i.e., when the myriad adjustments and small changes that teachers make in the ongoing classroom process prove insufficient in maintaining the flow of the lesson) (Peterson & Clark, 1978). This is consistent with findings from studies of the cognitive processing of professionals in other fields who are described by Simon (1957) as pursuing a strategy of "satisficing" rather than optomizing. Research by Doyle (1979) also indicates that it is "adaptive and efficient for a teacher to direct conscious processing primarily to discrepancies or anomalies. By specializing in discrepancies, teacher can anticipate disruptions and reduce the effects of immediacy and unpredictability on task accomplishment" (Doyle, 1979, pp. 62-63).

Leinhardt and Greeno (1984) describe the cognitive structures that teachers use to move back and forth between implementing pre-planned routines and adjusting their actions to new information that becomes available in the course of a lesson. They found experienced teachers to be distinguished by their ability to obtain and retain new information in interaction with students while continuing to maintain control of their agenda. Others have compared the schema that experienced teachers use to understand what is happening in the classroom with the way novices understand the same situation (Calderhead, 1983; Housner & Griffey, 1983).

Three studies examined the relationship between interactive decision making and student on-task behavior or achievement (Peterson & Clark, 1978; Doyle, 1977; Morine & Vallance, 1975). The interactive decision making of

effective teachers is characterized by rapid judgment, "chunking" of many events and cues into a few categories, differentiation of cues and events as to their impo. tance, and a willingness to change the course of classroom interaction when necessary.

The studies of teacher planning and decision making tell us a great deal about the task demands of teaching as well as about how particular teachers cope with those demands. The task environment of the classroom has been characterized by Shulman (1984) as more complex than that faced by a physician in a diagnostic examination. The teacher encounters a host of interrelated and competing decision situations both while planning and during teaching. There are no perfect or optimal solutions to these decisions. A gain for one student or in one subject matter may mean a foregone opportunity for others. A motivationally and intellectually profitable digression may reduce time devoted to the mandated curriculum. Such conflicts among teachers' multiple commitments lead to practical dilemmas (Berlak & Berlak, 1981; Lampert, 1984) which must be managed in interaction with students. Conflicting goals, combined with endemic uncertainty about how to achieve desired outcomes can lead to "knots" in teachers' thinking (Wagner, 1984,. Often these entanglements can only be sorted out as the teacher experiments with action and observes its outcome (Lampert, 1985). By such experimentation, teachers build a store of personal practical knowledge about how to get their job done (Clandinin and Connelly, 1984). The research supports an aggressive and responsible stance by teachers in the face of this complexity and uncertainty. But research on teacher thinking has not and should not be expected to provide specific prescriptions for how to plan or make interactive decisions. Rather, the main contribution of this work has been documented in some detail how and why teaching is cognitively complex and demanding.

Before much research was done on the nature of teachers' practical thinking, teachers were usually described as intuitive, nurturant, idealistic, present-oriented, and even "irrational" (Lortie, 1973; Bidwell, 1965; Jackson, 1971; Getzels & Jackson, 1963; Simpson & Simpson, 1969; see also Floden & Feiman, 1980). When researchers began to look more closely at the nature of teachers' thinking, judgments, decision making, and implicit theories, however, and to contrast knowledge use in practice with knowledge use in theory building, the terms of discourse began to change. The application of paradigms from newly developing branches of social psychology and ethnographic anthropology to studies of teaching has led to a reconsideration of the nature of teachers' intuition, idealism, and nurturance. Instead of being grounds for criticizing teachers, these elements of their activity are beginning to be seen as crucial to getting done the sort of work that they are expected to do (Hammersly, 1979; Smith & Geoffrey, 1968; Erickson, 1984; Bolster, 1983). Instead of disapproving of teachers' thinking when it is intuitive rather than logical, we are beginning to appreciate that strictly logical thinking is often not the most appropriate tool for solving the problems that teachers confront in classrooms. Instead of criticizing teachers for not making direct connections between future goals and present behavior, we have begun to understand the contradictions and uncertainties that make such connections impossible. Instead of seeing nurturance as something that teachers do naturally because the majority of them are female, we have come to see that teaching and learning are interactive processes and that knowledge of and concern for "the other" are essential to making progress. Instead of seeing all these features as limitations of teachers, we now understand that they are appropriate and essential for getting the job done.

Knowledge About Teachers' Knowledge

This new knowledge about how teachers get their work done is of worth to teachers not because it will provide them with new tools to use, but rather because it changes the way researchers view what teachers need to know; researchers can then be of more help to teachers. Rather than looking to research on teacher thinking to tell us what knowledge teachers *should* have and use, we can look to it for enlightenment on the question of what kinds of knowledge teachers *can* use. The descriptions of the way teaching is that have been produced by studies of teacher thinking can help to provide a framework for researchers to decide what sorts of information, advice, and support will be useable in the classroom.

First, we know that teachers need *contextual* knowledge (Smith & Geoffrey, 1968; Bolster, 1983; Elbaz, 1983). The decisions they make are situation-specific and must take into account the aspects of the immediate situation that make it different from any other case. The situations in which teachers decide what to do are continually changing. The circumstances that might suggest a particular route toward a goal can be wholly different from one moment to the next. At the same time, teachers need to know about the whole, both temporally and spatially (Doyle, 1977). What one decides to do today has a great deal to do with what happened yesterday and what effects such a decision will have tomorrow, next week, and next month. A teacher might choose, for example, to let one of her young students play at the sandbox just a few minutes longer rather than pressing him to do the assigned phonics work sheet because she knows that he has just negotiated a complicated set of social interactions to get to the sandbox, and he will be better able to concentrate on his phonics if he comes in later. (Marland, 1977, has named this kind of

decision "strategic leniency," while in earlier times the same teacher behavior could have been labeled "inconsistency" or "playing favorites.")

It is the context that shapes the teacher's thinking; it is the context within which he can make sense of and use researchers' knowledge about the relationship between time on task and school achievement. A teachers' job is to produce intellectual and behavioral changes in people who bring their whole selves to the learning situation and are constantly changing those selves in interaction with one another. A teacher must be able to invent her actions on the spot, and the knowledge used to create such inventions must be drawn from an awareness of the immediate social environment. Clandinin (in press) describes the way teachers conceive of their environment as a dynamic "image," a thought structure that derives from the experience of a person working in a context and adjusts to fit changes in that context. Prescriptions about how to teach spelling or place value or even good behavior that do not take into account this contextual knowledge of learners by teachers will not be of much worth in practice.

The knowledge of their work context that teachers have and use is also *interactive*. It is derived from pushing students and having them push back, from asking questions and watching for signs of understanding. This same knowledge could not be acquired by someone who simply observed, no matter how carefully. The thinking that teachers need to do in order to get students to do what they want them to do is of necessity nurturant. It is not only a matter of figuring out how to produce an outcome that will be positive for the student, but also convincing the student to see it that way as well. Teachers work at establishing a culture in which there is a shared understanding of what is happening and where it is leading, and they negotiate with students to ensure their membership in that culture (Florio, 1979; Erickson & Schultz,

1977). The sorts of judgments that teachers must make in order to keep everyone involved in the tasks at hand are drawn from ordinary social knowledge writ large (Lindblom & Cohen, 1979). A teacher must work at establishing relationships in which students care about doing what he wants them to do. He must find common points of interest, ways to meet students' social and emotional needs, and through it all enable the student to be an autonomous individual (Bidwell, 1965). A large part of what guides a teacher's thinking, planning, and decision making, then, is the goal of maintaining a productive social system. This involves knowledge of oneself as much as knowledge of individual students. There are certainly some techniques for learning about oneself and for maintaining constructive teacher-student relationships that are worth more to teachers than others (Elbaz, 1983; Clandinin and Connelly, 1984). But the professional teacher must be permitted and encouraged to pick and choose intelligently among such prescriptions just as we expect all mature human beings to exercise good judgment freely in establishing productive social relationships.

Thirdly, what we have learned about teaching requires us to define teacher knowledge as *speculative*. There is a great deal of uncertainty in the teacher's work; he chooses or rejects an exercise in the textbook, a particular seating plan, or a way of speaking to a child in the hope that it will produce the desired outcome. Everything a teacher does must allow for multiple unanticipated contingencies, most of which are beyond the teacher's control (Leinhardt & Greeno, 1984). What does a student already know? What happened on the bus this morning? What relationship exists between Johnny and Jeanie to shape their attention? What will Mary say next in the discussion? Who has read the book? Taken separately and given unlimited time, each of

these questions might be answered and the answers used to move on to the next decision about what to do. But the fact that many such questions arise in every moment of the teacher's day means that teachers need to take risks. Their thinking is of necessity hypothetical and probabilistic. The knowledge they use is tentative, subject to change, and transient rather than fixed, objective, and unchanging (Clandinin, in press).

Teachers need to invest in methods of working without knowing what the results of those methods will be. The importance of this point was highlighted recently in a lecture by a prominent cognitive acientist who emphasized how little is known in her field about the relationship between teaching and learning and who held out very limited hopes about what researchers will learn about this vital topic in the next several years. Meanwhile, teachers must work every day and have been working for centuries doing things that they hope will facilitate learning in children. Certainly, idealistic thinking is not out of line in their endeavors.

Knowledge of Methods of Inquiry

Finally, an important contribution of research on teacher thinking is the development and refinement of ways to observe, record, and make sense of the mental lives of teachers. These tools have been developed as means to the ends of researchers, but they also have great potential for use by teachers themselves as ways of learning about their own professional activities. These methods of inquiry offer interesting possibilities for adaptation in teacher preparation and professional development programs whose goals are to equip and encourage teachers to be reflective, analytic, and constructively critical of their own teaching. Teachers and teacher educators need ways of seeing, describing, and analyzing the complexities of teaching that go beyond what can

be done with structured or unstructured live observations. Researchers studying teachers' thought processes have employed stimulated recall, think aloud procedures, and structured journal writing to make visible the formerly hidden aspects of teaching. (These methods are described in some detail in Clark & Peterson, 1984.) And anthropologists of education have provided encouraging examples of what the ethnography of classrooms can accomplish in uncovering functionally important local meaning systems of teachers and students (Erickson, in press).

Conclusion

In conclusion, research on teacher thinking will be of worth to teachers to the extent that it provides a more full and appropriately complex portrait of teaching as a profession. This research has called attention to formerly invisible facets of teaching that are at once rewarding and demanding. This work challenges the image of the teacher as a technician, and the image of research as a source of empirically proven and generalizable prescriptions. In their place, teachers are cast as (potentially) reflective professionals, and research on teaching as a (potentially) supportive source of food for thought and aids to self-directed professional development. Research on teacher thinking and the knowledge derived therefrom has the potential for making teaching more rewarding and thoughtful, as well as more demanding and difficult. At the very least, this knowledge of the potential costs and benefits of attending to research on teacher thinking should be of worth to teachers.

References

Berlak, A., & Berlak, H. (1981). Dilemmas of schooling: Teaching and social change. London: Methuen.

Bidwell, C.E. (1965). The school as a formal organization. In J.G. March (Ed.), Handbook of organizations. Chicago, IL: Rand McNally.

Bolster, A.S. (1983). Toward a more effective model of research on teaching. Harvard Educational Review, 53, 294-308.

Calderhead, J. (1983, April). Research into students' and teachers' cognitions: Exploring the nature of classroom practice. Paper presented at the annual meeting of the American Educational Research Association, Montreal.

Clandinin, J., & Connelly, F.M. (1984). Teachers' personal practical knowledge. In R. Halkes & J. Olson, (Eds.), Teacher thinking: A new perspective on (persistent problems in) education. Heirewig, Holland: Swets Publishing Service.

Clandinin, J. (in press). Personal practical knowledge: A study of teachers' classroom images. Curriculum Inquiry.

Clark, C.M. (1984, June). Research on the service of teaching. Paper presented at the Contexts of Literacy Conference, Snowbird, Utah.

Clark, C.M., & Peterson, P.L. (1984). Teachers' thought process (Occasional Paper No. 72). East Lansing: Michigan State University, Institute for Research on Teaching.

Clark, C.M., & Yinger, R.J. (1977). Research on teacher thinking. Curriculum Inquiry, 7(4), 279-394.

Clark, C.M., & Yinger, R.J. (1979). Three studies of teacher planning (Research Series No. 55). East Lansing: Michigan State University, Institute for Research on Teaching.

Doyle, W. (1977). Learning the classroom environment: An ecological analysis. Journal of Teacher Education, 28, 51-55.

Doyle, W. (1979). Making managerial decisions in classrooms. In D.L. Duke (Ed.), Classroom management (Yearbook of the Society for the Study of Education). Chicago: University of Chicago Press.

Elbaz, F. (1983). Teacher thinking: A study of practical knowledge. New York: Nichols.

Erickson, F. (in press). Qualitative research on teaching. In M.C. Wittrock (Ed.), Handbook of research on teaching, (3rd ed.). New York: Macmillan.

Erickson, F., & Schultz, J. (1977). When is a context? Some issues and methods in the analysis of social competence. Quarterly Newsletter for Comparative Human Development, 1, 5-10.

Erickson, F. (1984). Classroom discourse as improvisation: Relationships between academic task structure and social participation structure in lessons. In L.C. Wilkinson (Ed.), Communicating in the classroom. New York: Academic Press.

Floden, R., & Feiman, S. (1980, April). Should teachers be taught to be rational? Paper presented at the annual meeting of the American Educational Research Association, Boston.

Florio, S. (1979). Learning to go to school: An ethnography of interaction in a kindergarten/first grade classroom (Occasional Paper No. 26). East Lansing: Michigan State University, Institute for Research on Teaching.

Getzels, J.W., & Jackson, P. (1963). The teacher's personality and characteristics. In N.L. Gage (Ed.), Handbook of research on teaching (pp. 832-856). Chicago, IL: Rand McNally.

Hammersly, M. (1979). Towards a model of teacher activity. In J. Eggleston (Ed.), Teacher decision-making in the classroom: A collection of papers (pp. 181-192). London: Routledge & Kegan Paul.

Housner, L.D., & Griffly, D.C. (1983, April). Teacher cognition: Differences in planning and interactive decision making between experienced and inexperienced teachers. Paper presented at the annual meeting of the American Educational Research Association, Montreal.

Jackson, P.W. (1968). Life in classrooms. New York: Holt, Rinehart & Winston.

Jackson, P.W. (1971). The way teachers think. In G.S. Lesser (Ed.), Psychology and educational practice (pp. 10-34). Glenview, IL: Scott, Foresman.

Lampert, M. (1984). Teaching about thinking and thinking about teaching. Journal of Curriculum Studies, 16, 1-18.

Lampert, M. (1985). How do teachers manage to teach? Perspective on problems in practice. Harvard Educational Review, 55, 178-194.

Leinhardt, G., & Greeno, T. (1984, April). The cognitive skill of teaching. Paper presented at the annual meeting of the American Educational Research Association, Montreal.

Lindblom, C. & Cohen, D. (1979). Usable knowledge: Social science and social problem solving. New Haven: Yale University Press.

Lortie, D. (1973). Observations on teaching as work. In R.M.W. Travers (Ed.), Second handbook of research on teaching (pp. 474-497). Chicago, IL: Rand McNally.

Marland, P.W. (1977). A study of teachers' interactive thoughts. Unpublished doctoral dissertation, The University of Alberta, Canada.

Morine, G., & Vallance, E. (1975). Special study B: A study of teacher and pupil perceptions of classroom interaction (Technical Report 75-11-6). San Francisco, CA: Far West Laboratory for Educational Research and Development.

Peterson, P.L., & Clark, C.M. (1978). Teachers' reports of their cognitive processes during teaching. American Educational Research Journal, 15, 417-432.

Shavelson, R.J. (1976). Teachers' decision making. In N.L. Gage (Ed.), The psychology of teaching methods, the 75th yearbook of the National Society for the Study of Education (Part 1, pp. 143-165). Chicago, IL: University of Chicago Press.

Shavelson, R.J., & Stern, P. (1981). Research on teachers' pedagogical thoughts, judgments, decisions, and behavior. Review of Educational Research, 51, 455-498.

Shulman, L.S. (1984, Autumn). It's harder to teach in class than to be a physician. Stanford School of Education News (p. 3). Stanford, CA: Stanford University.

Simon, H.A. (1957). Models of man. New York: Wiley.

Simpson, I., & Simpson, R. (1969). Women and bureaucracy in the semi-professions. In A. Etzioni (Ed.), The semi-professions and their organization: Teachers, nurses, and social workers (pp. 196-265). New York: Free Press.

Smith, L., & Geoffrey, W. (1968). An analysis toward a general theory of teaching: Complexities of an urban classroom. New York: Holt, Rinehardt, & Winston.

Wagner, A. (1984). Conflicts in consciousness: Imperative cognitions can lead to knots in thinking. In R. Halkes & J. Olson (Eds.), Teacher thinking: A new perspective on (persistent problems in) education. Heirewig, Holland: Swets Publishing Service.

Wittrock, M.C. (Ed.). (forthcoming). Handbook of research on teaching, (3rd ed.). New York: Macmillan.

Yinger, R.J. (1979). Routines in teacher planning. Theory Into Practice, 18, 163-169.