WELCOME TO THE ELECTRONIC RESERVES COURSE READINGS

TITLE: Classroom Instruction

AUTHOR: Linda M. Anderson

SOURCE: Knowledge Base for the Beginning Teacher

PUBLISHER: Pergamon Press

YEAR: 1989

PAGES: 101-115

File #: 040514003_Anderson

Knowledge Base for the Beginning Teacher

Edited by

MAYNARD C. REYNOLDS

Published for the
AMERICAN ASSOCIATION OF COLLEGES FOR TEACHER EDUCATION

by

PERGAMON PRESS

OXFORD · NEW YORK · BEIJING · FRANKFURT
SÃO PAULO · SYDNEY · TOKYO · TORONTO

CHAPTER 9

Classroom Instruction[1]

LINDA M. ANDERSON

Michigan State University

Introduction

The previous chapter described a cognitive—mediational view of learners and learning in terms of knowledge and the capacity for self-regulation. In this chapter the focus shifts to the knowledge base about classroom instruction that (a) helps students increase and elaborate existing knowledge, and (b) helps students increase their capacity for self-regulation of cognition. Chapters in this volume that present complementary perspectives are by McDiarmid, Ball, and Anderson (on subject-specific pedagogy) and Wang and Palincsar (on the development of self-regulation).

A cognitive–mediational perspective undergirds this chapter as in the preceding one: Learning occurs when learners actively transform incoming information and construct meaning in terms of their prior knowledge. Teachers and others influence learning not through mere transmittal of information but through their influence on the students' cognitive processing of that information.

Although this view of learning and instruction will not always represent the predominant paradigm, it is the prevailing view within the discipline of psychology at the moment, and presumably will be the basis from which future perspectives will develop. The cognitive–mediational perspective, as argued previously, supports conceptions of learning and instruction that are associated with meaningful and "higher-order" student learning, teacher efficacy, and equity of educational opportunities. Furthermore, teacher educators should proactively seek to facilitate the development of cognitive–mediational conceptions of learning and instruction in preservice and beginning teachers, especially when preservice teachers bring with them receptive–accrual conceptions of learning and instruction (i.e., beliefs that students passively receive and store knowledge without transformation).

In the preceding chapter, it was argued that prospective teachers typically are taught about learning and instruction through information that is organized as educational psychologists might describe the structure of their own discipline. It was suggested instead that a small number of core, organizing ideas should be the basis of the teacher education curriculum, which could serve as the framework for an integrated conception of learning and instruction, as opposed to presenting information via the structure of the discipline of educational psychology. (As teachers continue their professional development, it certainly is appropriate that they learn about the sources of professional knowledge, including the organization of various undergirding disciplines such as educational psychology.)

As in the previous chapter, organizing ideas are used here to describe the theory and research presented. Four organizing ideas were selected because they (a) represented conclusions supportable by contemporary theory and research and (b) corresponded to categories of teaching practice that are likely to be familiar to prospective teachers: presenting information, communicating about academic content, assigning work, and creating an environment that fosters learning. Beginning teachers, regardless of their assignments, will face these four tasks. The knowledge base can help them construct conceptual tools to use in making decisions about how to carry out those tasks.

Beginning teachers should understand these four

[1] The draft version of this chapter was reviewed by: Henrietta Barnes, Michigan State University; Lyn Corno, Teachers College, Columbia University; Greta Morine-Dershimer, Syracuse University; and Mary Rohkemper, Bryn Mawr College. Each made valuable suggestions, but the final version is totally the product and responsibility of the author. This chapter benefited from helpful comments about an earlier draft by teachers at Averill Elementary School, Lansing, Michigan and by faculty of Glassboro State College, New Jersey. The author gratefully acknowledges Helene Anthony, who contributed significantly to the annotated bibliography and other aspects of the chapter. Thanks are also extended to Barbara Reeves and Lisa Wilson for manuscript preparation throughout several drafts. AACTE expresses appreciation to all of the individuals who contributed to this paper.

organizing ideas in terms of how they relate to one another and how they are represented in the classroom. They are intended to be a practical means of organizing a large body of research and theory. The specific examples and details that support each organizing idea are, by necessity, limited in this presentation; this chapter by no means represents an exhaustive review of the literature about instruction. Other examples and studies could be used to support each point. In fact, when teaching about the organizing ideas, the examples and supporting detail the teacher educator uses should vary according to the background and experience of his or her students.

The four organizing ideas rest on two assumptions. First, it is assumed that a teacher must have information about the prior knowledge and ongoing cognitive processing of a particular group of students in order to plan and conduct instruction. Gaining this knowledge is dependent, in part, on the teacher knowing the subject matter well enough to recognize subtle misunderstandings by students.

Second, it is assumed that instructional goals change within lessons and across a series of lessons as students' knowledge and self-regulation changes. This means that what is appropriate instruction (e.g., the blend of modeling, explaining, and questioning) changes across the development of a lesson or series of related lessons. Similarly, because students differ in their knowledge about a particular topic, appropriate instructional practice varies among students for the same topic, and across topics for the same student.

These assumptions mean that wise instructional decisions are based only in part on a clear understanding of these four organizing ideas. Instructional decisions also must be based on teachers' ability to consider the demands of a particular situation, students' current knowledge and thinking, and the immediate and long-term goals for student learning. Thus, the declarative knowledge about instruction that is represented in this chapter is a necessary but insufficient condition for the preparation of beginning teachers.

Organizing Ideas about Classroom Instruction

Organizing Idea 1: Lessons in which learners perceive links among main ideas are more likely to contribute to content learning than are lessons in which links among main ideas are less easily perceived by learners. One way that teachers can facilitate students' perceptions of links among main ideas is through well-organized lessons and presentations.

Students construct and acquire new knowledge by actively relating new information to their prior understanding. In the previous chapter, the importance of a teacher's awareness of students' prior knowledge was emphasized. In this chapter, the focus shifts to new information and its role in new learning.

Teachers determine much of the information that a student receives and the form in which it is transmitted. Although the student is the final constructor of new knowledge, the form in which the information is transmitted will affect whether and how the new knowledge is constructed, especially for students who do not spontaneously search for meaningful relationships among ideas (i.e., younger students, lower-achieving students, special needs students, or students who are novices in a particular domain).

The terms *instructional presentations* and *lessons* refer here to any planned effort by the teacher to engage students with new (or not yet learned) information about academic content. Lessons created for purposes of teaching new information may take a variety of forms. Teachers may lecture, providing a large amount of information at one time, or they may provide information during interactions with students. (This situation is explored in greater depth in the second organizing idea.) Teachers also select readings for students and provide information that influences their text comprehension.

Regardless of the format, lessons may be characterized by the degree to which they explicitly highlight links among relevant ideas. A presentation with many explicit links among relevant ideas is considered to be well organized and clear. Why is it important that presentations are well organized? The answer is found in the cognitive–mediational view of learning that was described in the preceding chapter and expressed by Resnick (1985) in this way:

> As cognitive psychology has elaborated a theory of the human being as an active constructor of knowledge, a new view of learning has begun to emerge—one that describes changes in knowledge as the result of learners' self-modification of their own thought processes and knowledge structures. This in turn means that *instruction must be designed not to put knowledge into learners' heads, but to put learners into positions that allow them to construct well-structured knowledge.* [italics added] (p. 2579).

The function served by well-organized presentations of information is to aid the learner in processing the information in a manner that will aid construction of new understanding. Such processing requires that some pieces of information receive greater attention or are viewed from particular perspectives (e.g., seeing ways that new information contrasts with current knowledge, seeing the function of new information in terms of current task demands, or seeing new connections among ideas already in prior knowledge). These cognitive responses by the student are more likely to occur when the presentation itself prompts or facilitates them. More specifically, a well-organized presentation can cue the student about what existing schemata are relevant and should be activated, and what pieces of information are most important to consider while using the activated schema.

Research on Direct Instruction

Instructional presentations have been the subject of a great deal of research. Work during the 1970s and earlier—culminating in models for "direct instruction"—suggested that instruction should be organized according to a logical analysis of a task or a discipline, and presented according to the logical sequence of skills or facts that emerged. This work can be interpreted from a cognitive perspective by considering ways that all learners with limited prior knowledge are likely to process new information. Direct instructional models are less helpful when planning presentations in cases where prior knowledge is likely to interfere with new learning, or where learners have well-developed schemata for learning new information in a domain and need less external structuring of ideas for comprehension.

Several studies on clarity suggest ways of making one's message easier to follow by eliminating sources of vagueness (e.g., "chances are," "a few," "pretty much") and using signal words such as "because" and "therefore" (Hiller, Fisher, & Kaess, 1969; Rosenshine, 1971; Smith & Cotten, 1980). Perrot (1982) suggested that the following three factors determine clarity: continuity of organization and speech, simplicity of language, and explicitness. These principles are important in most lessons and can be used by beginning teachers early in their teaching.

Similarly, studies of direct instructional models in classroom settings suggest ways to make most lessons clearer and easier for students to follow. These models were derived primarily from process–product research of the 1970s which yielded evidence that students' scores on achievement tests are associated with certain instructional behaviors. Brophy and Good (1986) summarize principles for lesson organization in this way:

> *Structuring*. Achievement is maximized when teachers not only actively present material, but structure it by beginning with overviews, advance organizers, or review of objectives; outlining the content and signaling transitions between lesson parts; calling attention to main ideas; summarizing subparts of the lesson as it proceeds; and reviewing main ideas at the end. Organizing concepts and analogies helps learners link the new to the already familiar. Overviews and outlines help them to develop learning sets to use . . . Rule-example-rule patterns and internal summaries tie specific information items to integrative concepts. Summary reviews integrate and reinforce the learning of major points. (p. 362)

Brophy and Good (1986) also found research supporting redundancy and careful sequencing of information (especially during oral presentations), clarity, rapid pacing of presentations, and sufficient wait time for students' responses to teachers' questions.

Although the past decade has produced much analysis of the strengths and weaknesses of the direct instruction research base (Shulman, 1986), the work remains an important source of ideas about how teachers can organize lessons for direct presentation of information. It is important for beginning teachers to understand why the sequencing, pacing, and structuring components of direct instruction are effective for some purposes. One way to help beginning teachers understand this is to provide a theoretical foundation for the principles which also can be used to consider other models of instruction. Currently the best candidate is the cognitive–mediational perspective described in the preceding chapter. Within this perspective, information-processing theory (Simon, 1978) helps to explain the effects of careful sequencing, pacing, and structuring.

Rosenshine and Stevens (1986) applied such an analysis in their review of direct instructional models and drew these conclusions: Since humans are "limited-capacity processors," teachers need to avoid presenting too much information at one time and overloading students' short-term memory, which leads to information being ignored or only partially processed. When teachers carefully structure, sequence, and pace new information, students are more likely to process it in order and without missing part of the sequence. Similarly, using techniques such as reviewing prior knowledge at the beginning of a lesson, relating new information to prior knowledge, and providing organizers and outlines may facilitate students' encoding of new information.

Instructional design literature (e.g., Gagne & Briggs, 1979) is another well-known source for how to organize presentations of information within lessons. This literature corresponds to the process–product research in its emphasis on careful structuring and organization of information for presentation. Although the role of prior knowledge is acknowledged, the cognitive–mediational perspective with its emphasis on learners' construction of knowledge is not the primary foundation of the instructional design literature.

Instructional Research from a Cognitive–Mediational Perspective

Although direct instructional research can be interpreted from a cognitive perspective, it was not originally based theoretically on cognitive or constructivist views of learning. Other instructional research has been more directly based on the view of learning presented in the preceding chapter. That work is reviewed in this section.

A large body of research exists on ways to prepare students to learn from lessons. Notions of schema activation are the basis of this work. Ausubel (1968, 1978) and Mayer (1979) wrote about advance organizers, which are statements made at the beginning of lessons (or readings) that provide superordinate concepts for organizing the specific ideas to be presented in the lesson. Evidence for the value of advance organizers in promoting learning has been mixed (Barnes & Clawson, 1975). Advance organizers seem to be most helpful to

learners who lack some prerequisite knowledge. All in all, it seems reasonable for beginning teachers to know that advance organizers might be one way to make students more active processors of information by helping them see connections between ideas and anticipate content in a presentation, discussion, or reading.

Like research on advance organizers, research about prereading preparation is based on notions of schemata. In general, readers' comprehension is facilitated when teachers activate or teach necessary prior knowledge (i.e., activate relevant schemata) before students read passages. Teachers cannot take for granted what students' prior knowledge might be; one important purpose of prereading discussions may be to provide teachers with information about students' prior knowledge to determine what can be activated (Langer, 1981, 1984a).

Similarly, teachers who wish to make explicit links among ideas within lessons must gain information about how students are constructing knowledge as the lesson proceeds. Although teachers usually plan presentations of information beforehand, they must also attend to cues received during the lesson about how students are making sense of the information, and stand ready to adjust the presentation of new information according to student responses. This aspect of information giving has been called "responsive elaboration" (Duffy & Roehler, 1987). Responsive elaboration often takes place in group dialogues, which also serve as sites for developing metacognitive knowledge, as described in the next organizing idea.

Thus, in order to enact the general principle that lessons with explicit links among ideas can facilitate learning, teachers must be able to adjust their presentations and responsive elaborations according to students' understandings. A teacher's capacity to respond to students with appropriate linking ideas may depend in large part on the teacher's own knowledge of the content and store of representations (C. Anderson, in press; McDiarmid, Ball, & Anderson, 1989; Roehler et al., 1987; Shulman, 1987).

This suggests that beginning teachers cannot learn about instruction in a vacuum, apart from considerations of students and content. Knowledge about students and content interacts with knowledge about instructional principles when making decisions about how and when to present new information.

Recognizing this, much current instructional research focuses on particular subject matter areas and ways that teachers can help students see relationships among ideas about particular topics. Beginning teachers should be aware of some of this research, which can aid in understanding the relationship between questions of curriculum (i.e., *what* should be taught) and instruction (i.e., *how* should it be taught). A selective review of studies that contribute to the knowledge base about instruction for meaningful understanding and self-regulation about specific curriculum topics follows.

Reading. Instructional presentations in reading have been studied extensively by Duffy and Roehler and colleagues (e.g., Duffy, Roehler, Meloth, & Vavrus, 1986; Duffy, Roehler, & Rackliffe, 1986). They concluded that, too often, teachers' explanations about the cognitive processes used when reading strategically are not explicit enough. Not only is there a lack of explicit links among ideas, but also there are problems with what teachers are explicit about—for instance, emphasizing decontextualized skills and procedures rather than cognitive processes used by readers. Duffy and Roehler emphasized the importance of stating clearly at the beginning and throughout a lesson the relevant declarative, procedural, and conditional knowledge that is the focus of that lesson. For example, teachers should state not only what the lesson is about, but also how to carry out the thinking involved and indicate when the new knowledge might be useful. In order to teach procedural knowledge about strategic reading, they recommend that teachers model their thinking and thus make their metacognition explicit; this is different from simply being explicit about steps in a procedure (Duffy, Roehler, & Rackliffe, 1986).

Reciprocal teaching (Palincsar & Brown, 1984, in press) is another excellent example of a reading instructional technique that employs metacognitive strategies and provides opportunities for explicit connections between content and the strategies required to process that content. Because this technique is also a clear example of scaffolding during instructional dialogue, it is discussed further in the next section.

Math. Schoenfeld (1985) and Hiebert (1986) have written about ways that teachers can help students make links among conceptual and procedural knowledge in mathematics. Specific instructional programs that emphasize as one component the teacher's role in explicitly making connections about main ideas are Schoenfeld (1985); Fennema, Carpenter, and Peterson (1986, in press); Lampert (in press); and Madsen-Nason and Lanier (1986).

Science. Most recent instructional research in science has considered the problem of promoting in students conceptual change about core scientific ideas. Conceptual change teaching requires that learners become dissatisfied with their current ways of explaining phenomena and accept an alternative explanation as better (Posner, Strike, Hewson, & Gertzog, 1982). Examinations of how teachers accomplish this in classrooms reveal that a critical teacher's role is to highlight, in both presentations and responsive elaboration, the relationships among competing explanations and the ways that explanations account for observed phenomena (Anderson & Smith, 1987; Carey, 1986; Champagne, Klopfer, & Gunstone, 1982; Roth, Anderson, & Smith, 1987). Teachers' capabilities in these areas are

determined by both their own content knowledge and their personal theories of learning and instruction (i.e., a cognitive–mediational perspective underlies an understanding of conceptual change teaching).

This discussion has ended with an overview of current efforts to understand instruction of specific subject matter. Like earlier work that resulted in direct instruction models, the contemporary focus supports the general proposition that teachers must make clear the links among important ideas. However, the more recent work focuses less on ways of organizing information in advance for presentation to learners and more on interactions between teachers and students about the content, and how explicit links among ideas are made during their interactions. The next section focuses on the nature of teacher–student interactions and more directly addresses the question of *when* to make explicit links among ideas in response to cues from students about their understanding of those ideas.

Organizing Idea 2: Teacher–student interactions about academic content are also an important means through which students come to perceive links among ideas (and thus to construct knowledge). In particular, teacher–student dialogue that involves "scaffolding" and eventually "fading" by the teacher appears to be associated with academic goals of knowledge construction and self-regulation.

Teacher–student interactions have been the focus of a great deal of study. Work within the process–product tradition of the early and mid-1970s focused almost exclusively on interactions during academic instruction and led to a series of recommendations that have been characterized as the direct instruction model described in the preceding section. With the process–product research, more "effective" teachers (defined in terms of student achievement gains) engaged in more academic interactions and fewer behavioral or procedural interactions with students. The more effective teachers in the early grades engaged in fairly fast-paced interactions that usually resulted in successful responses from their students followed by feedback to confirm or explain (Brophy & Good, 1986; Rosenshine & Stevens, 1986).

It certainly makes sense that teachers who spent more rather than less time interacting with students about content would help those students learn the content. This research is valuable to beginning teachers in that it demonstrates that what is common sense is not necessarily common practice. That is, many teachers who were studied did not interact a great deal with their students about content. This research has yielded several sources that can help beginning teachers think about interaction patterns and ensure that they fulfill the minimally necessary requirement for discussing content with students. (Several models of instruction are reviewed in Rosenshine & Stevens, 1986; also see Berliner, 1987; Rosenshine, 1987).

In particular, the early work on teacher–student interactions focused attention on teacher expectation effects, or how teachers' predictions about students' future academic performance can (usually unintentionally) disadvantage students with a history of low achievement through patterns of interactions that reduce opportunities to learn. Several excellent reviews of this literature are available to teacher educators (Brophy & Good, 1974; Cooper & Good, 1983; Cooper & Tom, 1984; Dusek, 1985; Good, 1980, 1987).

For example, the following teacher practices were used more often with students for whom teachers held low expectations (Good, 1987). Notice how each of the practices reduces the students' opportunity to interact with the teacher about academic content:

1. Waiting less time for "lows" to answer.
2. Responding to incorrect or incomplete answers by giving the answer or moving to another student rather than giving clues (i.e., instead of engaging in "scaffolding" as discussed later in this section).
3. Failing to give feedback to public responses.
4. Calling on students less often to answer questions.
5. Giving briefer and less informative feedback to questions.

Expectation effects also have been documented for groups of students as well as for individuals, showing that some teachers behave quite differently toward higher-achieving groups than toward lower-achieving groups, and that the differential treatment usually creates less desirable conditions for learning for the lower achievers. This differential treatment often results in lower-quality teacher–student interactions about content and sometimes results in less meaningful tasks for lower-achieving groups (Allington, 1983; Borko & Eisenhart, in press; Eder, 1981; Good & Marshall, 1984; Hiebert, 1983).

Not all teachers interact with lower-achieving students in deleterious ways. Some teachers remain aware of their expectations and use that awareness to plan more appropriate patterns of teacher–student interactions. In order to be proactive rather than reactive to predictions for students' achievement, the beginning teacher must first understand how expectations can work to depress opportunities for students to interact with the teacher in productive ways. When teachers are unaware of expectation effects they are more likely to interact with their lower-achieving students in ways that perpetuate their lower-achievement status. As noted in the preceding chapter, one advantage of the cognitive–mediational perspective on learning is that it is less likely to lead to beliefs that students cannot learn.

Scaffolding

In recent years, many instructional psychologists, building primarily on the work of Vygotsky (1978), have described a style of teacher–student (or expert–novice) interaction called *scaffolding*. Scaffolding occurs when a teacher provides assistance and guidance to a student who is having difficulty completing a task or answering a question on his or her own. Scaffolding is similar to

the "guided assistance" or "guided practice" stage of many lesson models. However, many of the more traditional lesson models (Rosenshine & Stevens, 1986; Hunter, 1982) assume that practice (whether guided or independent) occurs only to strengthen associations that have already been created through the teacher's presentation. That is, the student's role is to reflect what is taught, and the function of practice is to strengthen the associations and receive correction when necessary; the teacher's role is to ask questions and provide confirming or corrective feedback.

In contrast, instructional psychologists who study scaffolding base their analyses on a cognitive–mediational view of learning in which the student continually constructs meaning and the teacher presents information in a manner that aids in this construction. An early definition of scaffolding is offered by Wood, Bruner, and Ross (1976): "A process that enables a child or novice to solve a problem, carry out a task, or achieve a goal which would be beyond his unassisted efforts" (p. 90). Others have described scaffolding using a construction metaphor: A temporary and adjustable structure that allows accomplishment of a task that would be impossible without the scaffold's support.

The critical component of the teacher's role in scaffolding is knowing what information to present and when to present it in order to support students in their efforts to understand a topic or solve a problem. That is, the teacher must seek information about each student's current understanding and respond to that by presenting new information or reframing the problem. In classrooms this often occurs during dialogue with students about academic tasks, often in a group setting.

Although almost all classrooms are characterized by group discussions about academic tasks, not all such discussions are true dialogues in which scaffolding is provided. In fact, Palincsar (1986), in a survey of the research on classroom discourse, concluded that very little teacher–student interaction is actually dialogue that furthers knowledge construction by students. Instead, most teacher–student interaction appears only to pose questions and assess answers.

Such findings suggest that beginning teachers need to recognize what is different about scaffolded dialogues and other forms of teacher–student interactions. They also need to understand why many instructional psychologists maintain that scaffolded dialogue is the primary way to achieve objectives of higher-order learning. The following section documents the knowledge base for this assertion.

The knowledge base for scaffolding. Langer and Applebee (1986) trace the historical development of a social constructivist view of classroom instruction (the label given to instructional theories that assume that social interaction is key to the development of knowledge). They cite early work on language development by Bruner and colleagues, who built on the work of Soviet psychologists, as instrumental in this line of work. Bruner, in fact, is credited with the first use of the term *scaffolding*. He used it to describe mothers' verbal interactions with their toddlers while reading them books for the purpose of teaching new words:

> Bruner . . . suggests that the adult caretaker reduces the degrees of freedom with which the child has to cope, concentrates the child's attention into a manageable domain, and provides models of the expected dialogue from which the child can extract selectively what is needed for filling the appropriate role in discourse. (Langer & Applebee, 1986, p. 176)

In other words, the more knowledgeable adult simplifies the situation so that the child is capable of responding independently. Although the problem is not diminished, greater resources are made available to the child to solve it. In addition to simplifying task demands, scaffolding also helps the child extend new learning to broader contexts by highlighting connections across situations, thus aiding the construction of more elaborate knowledge structures.

Similar work on parent–child interactions have been reported by Wertsch (1979). Wertsch argues that it is within such scaffolded dialogues that children develop metacognition and learn how to use it in school and everyday tasks. This development occurs through the gradual internalization of the scaffolding provided by adults so that the cognitive work involved in problem solving moves from the "interpsychological plane" (social) to the "intrapsychological" plane (individual). This is accomplished through interactions with teachers or parents (or, presumably, any expert problem solver) when they:

> 1) Inform the child about the nature of the goal;
> 2) Make the child aware of the facts relevant to the task;
> 3) Arrange the environment in a way to help the child deal with each step of the task separately; and
> 4) Remind the child where she or he is in that task. (Langer & Applebee, 1986, p. 179)

Another description of how teachers aid children in solving problems is offered by Feuerstein (Brainin, 1985), who calls this style of teaching *mediated instruction*. He suggests that teachers mediate for children to aid their emerging understandings by: the expression of intentionality through explicitness about purpose and prediction of what will occur, and how events are related to the instructional purpose; explorations and assignment of meaning to stimuli, or interpreting events for the child in a meaningful manner; relating those meanings to a larger sphere of significance, thus showing what individual problems and solutions have in common with one another; and providing opportunities for new understanding to be applied.

Instructional researchers working within the social constructivist perspective have concluded that lessons (or series of lessons) that accomplish this internalization of problem-solving strategies follow a pattern: teachers model, then coach, then fade (Collins, Brown, & Newman, in press; Pearson & Dole, 1987; Roehler & Duffy, in press). Modeling is used to show explicitly how to think strategically about the problem at hand (e.g., determining the meaning of a word based on context clues). Modeling involves thinking aloud, explicitly pointing out information to be considered and sought, suggesting alternatives to adopt or reject, and showing how solutions are tested. Coaching is when scaffolded dialogue is most evident; the teacher presents problems to the students, yet provides the hints and cues necessary for students to solve the problems. As students become more adept, the teacher offers less and less support and scaffolding and gradually fades the support to allow students independent practice in using the newly constructed knowledge. In order to insure that students have constructed flexible knowledge that is useful in a variety of situations, the teacher continues to pose problems that test the depth of understanding, offering scaffolding as necessary to help students see the links between situations in which the new knowledge can be used.

One excellent example of such a model is reciprocal teaching (Palincsar & Brown, 1984). Students and teachers each participate in dialogues about text (often drawn from content areas) and alternate playing the teacher role, which consists of presenting information about the cognitive processes they use while reading. Information presentation is structured around four activities that underlie effective comprehension monitoring: question asking, summarizing, clarifying, and predicting. The teacher models how to do this and provides extensive help to students as they begin this form of dialogue. Transcripts reveal that after a few weeks of instruction, students begin to internalize the comprehension–monitoring strategies and are able to discuss the text with less scaffolding by the teacher.

Collins, Brown, & Newman (in press) report that instructional programs based on this theoretical perspective have produced learning in areas of reading (Palincsar & Brown, 1984), composition (Scardamalia & Bereiter, 1985), and mathematics problem solving (Schoenfeld, 1985). However, successful use of such instructional models by beginning teachers will depend on their understanding of the underlying principles of learning and instruction (i.e., a cognitive–mediational perspective), which may be very different from more traditional, fact-acquisition approach to instruction (i.e., a receptive–accrual perspective) (L. Anderson, in press; Langer, 1984b). Unfortunately, the roles of scaffolder and dialogue participant probably are not enacted by most teachers today. Instead of seeing themselves as supporters of students' constructions of knowledge, many teachers see themselves as presenters of content (especially facts and skills) and as orchestrators of activities that bring students in contact with that content (i.e., the receptive–accrual view described previously). One result is the predominance of the recitation mode of instruction, in which the teacher asks a question, students offer answers that the teacher confirms or disconfirms and the cycle is repeated. Teachers spend little time in the classroom encouraging students to explain how and what they are thinking, elements that are necessary for scaffolded dialogues.

A "content-presenter" perspective makes sense, given teachers' prevailing conceptions of knowledge and learning (L. Anderson, in press, Olson, 1983), but it does not support the type of instruction necessary to promote the twin goals of knowledge restructuring and self-regulation in students. This suggests that beginning teachers should have as part of their preservice education a thorough grounding in the rationale for instruction based on scaffolded dialogues in order to be able to use the methods flexibly. They also need to understand what is difficult about creating scaffolded dialogues in a group setting and to learn procedures for carrying out this instructional model.

Teacher educators may accomplish this by using case studies and lesson transcripts from articles about instructional models that incorporate scaffolded dialogue. Preservice students can learn this technique first-hand if their college instruction proceeds according to this model. Learning to teach indisputably is a higher-order goal that can be achieved in part through scaffolded dialogues about problems of practice.

Organizing Idea 3: Teachers facilitate learning by engaging students in active cognitive processing about academic content through academic tasks. The teacher's selection and presentation of tasks will determine the quality of cognitive processing by students.

The concept of academic task has been prevalent in much instructional research of the past decade. Generally, academic tasks are whatever the teacher requires of students in order to engage them in thinking about or demonstrating competence with certain academic content. Some have argued that academic tasks are the fundamental units of analysis in classrooms, especially if one wants to link what is known about learning and instruction with what is known about classroom settings (Blumenfeld, Mergendoller, & Swarthout, 1987; Doyle, 1983; Mark & Walsh, 1988).

Beginning teachers should be familiar with the literature on academic tasks in order to understand how their personal theories about learning and instruction, combined with their knowledge of content and curriculum, must be translated into a form that engages students in cognitive activity about the content. A teacher who has adopted a cognitive–mediational perspective on learning must constantly question what is occurring inside students' minds: "Are they making sense of this content and thus learning it as I intended when I planned this lesson? What can I do or say that will further their sense-making or redirect their thinking?" Tasks are the mech-

anisms through which teachers initiate cognitive activity about content and see evidence of its presence.

Academic tasks result when the teacher demands some response about academic content from students, such as listening to and comprehending a lecture, answering questions during a discussion, writing a paper defending a position, reading a book and planning a report, studying for a test, or completing a worksheet. Presumably, the particular tasks are selected because they promote learning the content in the manner intended by the teacher through engagement in some cognitive activity. (Examples of cognitive activity include attending to relevant points, recognizing how new content fits into or contradicts existing schemata, encoding and storing new information for particular purposes, or rehearsing associations to make recall automatic given the right cue.)

The past decade has yielded a great deal of research and literature that suggests that the beginning teacher should attend to tasks and their effects. Awareness of this literature may lead the beginning teacher to appreciate the complexity of providing academic instruction in classroom settings, and to recognize that knowledge of general instructional principles, such as the two preceding propositions, is necessary but not sufficient for good teaching. In addition, the beginning teacher must understand the nature of classrooms as social environments within which academic tasks are carried out by individuals. (Some aspects of social context are addressed in chapters by Florio-Ruane and Cazden and Mehan in this volume; thus, discussion of social factors in this chapter is limited to those most directly affecting academic instruction.)

The literature on academic tasks may be divided into four topics: (a) the relation of task engagement to learning; (b) the effect of the classroom context on tasks; (c) features of tasks that promote higher-order cognitive engagement; and (d) features of teacher communication about tasks that are related to intrinsic motivation.

The relation of cognitive engagement to learning. A basic tenet of the cognitive–mediational perspective on learning is that active processing by the learner is necessary for learning to occur. This argument was established in the late 1960s and early 1970s by basic research in cognitive psychology (R. Anderson, 1970). When this issue was first studied in classrooms, however, the nature of cognitive engagement was not investigated. Instead, researchers focused on behaviors that implied that students were at least attending to the task at hand. This body of research, known as *time-on-task* literature, established that students who appeared to be engaged more of the time scored higher on achievement tests than students who were not as fully engaged. The value of this research to the beginning teacher, who might scoff at the common sense nature of the findings, lies in its description of the range of engagement levels in various classrooms. While the value of attention to task seems commonsensical, it is not easy to create high levels of engagement in classrooms. Beginning teachers need to understand the importance of basic management systems that help them focus students on tasks. (See the chapter in this volume by Evertson for a review of the management literature.)

During the 1980s, research on engagement has documented more about the nature of engagement associated with learning. For example, Peterson and Swing (1982) found that students who scored higher on tests on a math unit they had just completed reported engaging in specific cognitive strategies during the lesson; students who could not report specific strategies or who did not report attention to the lesson scored lower. An examination of first graders doing seatwork tasks documented very different ways of thinking about tasks by higher and lower achievers, differences that were associated with task performance (Anderson, Brubaker, Alleman-Brooks, & Duffy, 1985). Work cited in the preceding chapter on metacognition has documented the differences between good and poor readers in their cognitive processing while reading text.

The effect of the classroom context on tasks and associated cognitive processes. It is not enough for beginning teachers to accept the importance of cognitive processes during task performance. They must also understand how tasks, as the immediate stimuli for cognitive processes, are part of a larger social context that can influence students' cognition during task performance. The larger context influences students' beliefs about purposes for doing schoolwork.

Several writers have addressed the topic of task systems in classrooms, most notably Doyle (1983, 1986; see also Blumenfeld et al., 1987; Bennett, Desforges, Cockburn & Wilkinson, 1984; Marx & Walsh, 1988).

The most important point made by these and other researchers is that tasks shape the cognitive activity of students, often in ways that were not intended by the teacher, as summarized by Doyle (1983) in this way:

> Students' academic work in school is defined by the academic tasks that are embedded in the content they encounter on a daily basis. Tasks regulate the selection of information and the choice of strategies for processing that information . . . Students will learn what a task leads them to do, that is, they will acquire information and operations that are necessary to accomplish the tasks they encounter . . . A task has two consequences. First, a person will acquire information—facts, concepts, principles, solutions—involved in the particular task that is accomplished. Second, a person will practice operations—memorizing, classifying, inferring, analyzing—used to obtain or produce the information demanded by the task. (p. 162)

Doyle then describes four types of tasks with associ-

ated types of cognitive activity: memory tasks (recognize or reproduce information previously encountered); procedural or routine tasks (apply a standardized and predictable formula to questions with only one correct answer); comprehension or understanding tasks (select and apply various operations on previously unencountered information or problems); and opinion tasks (express one's point of view, with no correct answer expected). A similar way of classifying tasks is offered by Bennett et al. (1984; also see Bennett & Desforges, 1988).

Unfortunately, the beginning teacher must know more than how to classify tasks and their associated cognitive operations because the task that is assigned is often not the task that is accomplished, even though superficially it remains the same assignment. Doyle (1983) argues that the evaluative nature of schooling connects academic tasks to reward structures in students' minds. This means that students become concerned with the *ambiguity* (the degree to which a correct answer can be predicted in advance) and the *risk* (the stringency of criteria for performance) involved in academic tasks. Students will attempt to reduce ambiguity and risk in a variety of ways such as changing a comprehension task into a memory or procedural task. Such alterations have the effect of lowering the level of cognitive demand of tasks.

Features of tasks that may promote higher-order learning. The literature just cited could leave beginning teachers in a quandary. If they have adopted a cognitive–mediational perspective on learning they will want to engage students with a large number of comprehension tasks, since those are tasks most likely to promote higher-order learning (i.e., knowledge restructuring and self-regulation). The literature on classroom management (see Evertson, 1989) suggests that it is important to hold students accountable for performance on tasks; otherwise, overall levels of engagement drop. However, the literature on tasks suggests that many students will resist comprehension tasks because of their inherent ambiguity and possible risk within the classroom accountability system. If not held accountable, students may not engage at all; if held too accountable, students may concentrate their energies on reducing the ambiguity of comprehension tasks by converting them to memory or procedural tasks.

This dilemma suggests that beginning teachers need to give thought to students' perceptions of tasks and accountability and to consider ways to reduce students' anxiety about evaluation while at the same time maintaining some press for engagement. Doyle (1986) offers suggestions based on observations of teachers who have resolved the dilemma through adjustment of the accountability system. Initially, at least, students are given many resources for improving their grades, which reduces risk even if ambiguity remains high.

Other ways that teachers can succeed with comprehension tasks may lie with their instruction. Instruction that (a) reduces risk and ambiguity through the teacher's modeling, (b) includes coaching through scaffolded dialogue, and (c) draws frequent conceptual links to clarify to the student the relevant dimensions of the task, is most likely to result in success in comprehension tasks.

In recent research where instructional models were created and studied for effects on higher order learning, the nature of the tasks differed from those tasks typically encountered in classrooms. Thus, these studies suggest some guidelines for instructional programs that, if used in classrooms with congruent instruction and appropriate accountability systems, might engage students in the cognitive processes that underlie higher order learning.

In these instructional programs, tasks create contexts in which teachers can learn about student thinking and respond with scaffolding to guide or redirect their thinking. Tasks in the programs are characterized by the following features (L. Anderson, in press): First, tasks are problems to be solved, not stimuli for the recall of specific information or application of particular procedures. Scardamalia and Bereiter (1985) describe appropriate tasks as "compositional," with "emergent goals." This means that goals change as the demands of the problem become clearer. Examples of compositional tasks include planning a trip, constructing a scientific theory, or writing an essay. Such tasks require that the student define and represent the problem as well as work out its resolution.

Second, tasks involve questions that have many "correct" answers, although there are standards that guide the teacher's response to improve an answer. In many cases, the students' explanations of their thinking are as valued as the answers.

Third, tasks are often carried out through group discussion, thus allowing the teacher to adjust the difficulty of the task through scaffolding.

Examples of tasks that meet these criteria include science discussions that center on the explanation of real-life natural phenomena (Roth et al., 1987); word problems in math that require students to define the problem as well as solve it (Fennema et al., 1986; in press); analyzing reading processes within a group discussion (Duffy & Roehler, 1987; Palinscar, 1986); composing a paper for a particular audience and purpose (Scardamalia & Bereiter, 1985; Englert & Raphael, in press).

In contrast, tasks in most classrooms are characterized by demands for knowledge reproduction—rote recall of facts or skills—without requiring students to understand the goals of the task and to engage in strategic, goal-directed cognition. Instead, goals are clear-cut and determined in advance, and feedback is based on correctness or completeness (Anderson et al., 1985; Blumenfeld et al., 1987; Davis, 1986; Doyle, 1983; Durkin, 1984; Goodlad, 1984).

In fact, many recent descriptions of schooling have decried the passive approach to knowledge taken in many schools and reflected in tasks (Goodlad, 1984;

Sirotnik, 1983). The concern is that current approaches to instruction and tasks result in *inert knowledge*: propositional knowledge that can be expressed but not used (Whitehead, 1929). Bereiter and Scardamalia (1985) suggest that many characteristics of school tasks create conditions in which inert knowledge is useful to students, who accept it as the expected form of school learning. Bereiter and Scardamalia (1985) offer examples of task features that promote inert knowledge and suggest that they be minimized: (a) testing on content only in the form in which it was taught; (b) presenting test items in the order taught, which means that episodic, sequential encoding without understanding is sufficient for recall; (c) teaching concepts in hierarchically ordered fashion, which means that students do not need to engage in goal-directed memory searches since descriptor-driven recall will suffice; and (d) assigning writing topics that can be completed through spontaneously recalled content rather than goal-directed accessing and knowledge transforming.

Such features characterize many of the tasks recommended in commercially published instruction manuals. Certainly, beginning teachers will not be able to revise all tasks that accompany their district's curriculum requirements. However, if beginning teachers are aware of ways that certain types of tasks can circumvent higher order thinking, they will be more careful in their selection, presentation, and monitoring of student work.

Features of teacher communications about tasks that are associated with intrinsic motivation. Doyle's (1983) description of students as eager to reduce the ambiguity and risk levels of tasks suggests that students are primarily concerned with the extrinsic aspects of the accountability systems in classrooms, rather than the intrinsic rewards associated with learning from task performance. Recent reviews (e.g., Brophy, 1983, 1987) suggest that this may be the case in many classrooms. Beginning teachers should be aware that their students, especially on the secondary level, may bring with them a set of beliefs about school tasks that present a challenge to any teacher whose goals include higher-order learning.

However, extrinsic motivation may not be inevitable. Some recent motivational literature suggests features of instruction that are associated with intrinsic motivation. Some of this literature describes organizational features of the classroom, which is discussed here under Organizing Idea 4. Other literature describes teacher communications about tasks that help create a context in which tasks may be perceived as intrinsically valuable. Brophy (1987) reviewed this field and offered suggestions for motivating students to learn that include modeling outside learning (e.g., reporting on learning through newspapers, books, classes, etc.); (b) communicating the assumption that students are eager learners who recognize the value of learning; (c) minimizing performance anxiety; (d) inducing curiosity or dissonance about the topic; (e) making abstract content more personal, concrete, or familiar; and (f) modeling task-related thinking and problem solving. Many of these suggestions reflect the instructional principles already discussed in this chapter. Beginning teachers should understand that "good teaching" that promotes knowledge restructuring and self-regulation is more likely to foster intrinsic motivation than teaching that is poorly organized and lacking in supportive interactions. Motivation is not a separate process from learning, and motivating students is not accomplished apart from instruction.

Organizing Idea 4: Teachers' decisions about classroom structure and organization have implications for students' beliefs about themselves and about school tasks.

The preceding section described ways that student motivation is influenced by teacher communication about tasks. Motivation to perform tasks is also affected by several features of the larger classroom environment that at first glance are not directly related to cognitive processes used when performing tasks. However, these features of the environment indirectly influence students' cognitive involvement with learning because they are related to both components of motivation: students' beliefs about themselves and their beliefs about task value.

Meece and Blumenfeld (in press) reviewed research about the factors associated with intrinsic and mastery motivation. They concluded that classrooms in which there are many external rewards for performance, competitive situations established by the teacher, frequent social comparisons, and/or teacher control of tasks and information, are more likely to have students with lower levels of intrinsic motivation, even when the individual students have high perceptions of competence (Ames, 1984; Ames & Ames, 1984; Deci & Ryan, 1985; Eccles, Midgely, & Adler, 1984; Marshall & Weinstein, 1984, 1985).

In contrast, learning situations that are most conducive to mastery orientations in students are characterized by opportunities for student control and autonomy (deCharms, 1968; Deci & Ryan, 1985; Ryan, Connell, & Deci, 1985); novel or optimally challenging tasks (Deci & Ryan, 1985) without too great a risk of failure (Doyle, 1983); and reward structures that minimize social comparisons and competition (Ames, 1984; Nicholls, 1979, 1983; Marshall & Weinstein, 1984).

Meece and Blumenfeld (in press) concluded that even though students enter classrooms with personal motivational orientations (as described in the preceding chapter), teachers can affect how students approach tasks.

Similarly, Marshall and Weinstein (1984) reviewed classroom factors affecting students' self-evaluations and concluded that a complex constellation of interactive factors were related to student's beliefs about their competence in a particular classroom. These factors included: task structure (i.e., the extent to which students do the same task at the same time according to the same standards); grouping (purpose, frequency, and

stability of grouping); locus of responsibility in learning and evaluation (the degree to which students have choices and self-evaluate their work); evaluation and feedback procedures and information about ability (especially, how public is that information); and motivational strategies used by the teacher (extrinsic vs. intrinsic and cooperative vs. competitive).

Marshall and Weinstein (1984) concluded from this review that students' self-evaluations are likely to be higher in classrooms with multidimensional tasks (i.e., many abilities are valued and needed to perform tasks in the room and different students are doing different tasks at any given time) and cooperative atmospheres. This conclusion is congruent with that of others who have studied classroom structural factors (Cohen, 1987; Rosenholtz & Wilson, 1980).

Recent work on socialization styles related to students' perceptions of competence and control suggests that the degree to which the teacher provides information that allows students to predict contingencies is important because it forms a basis for a sense of personal control. When coupled with opportunities for self-regulation of behavior, provision of information about the environment characterizes classrooms where students show desirable changes in their personal beliefs (Anderson, Stevens, Prawat, & Nickerson, 1988).

What does this literature offer to the beginning teacher? It suggests that many of the supposedly routine organizational decisions made by teachers (e.g., grouping students or establishing systems for reporting feedback to students and systems for rewarding certain behaviors) have important consequences that are not evident when the teacher focuses only on immediate outcomes. It is important that beginning teachers be aware that many decisions about classroom organization have ramifications for students' beliefs about themselves and about tasks. These beliefs, in turn, will mediate the effects of academic instruction.

When teachers can provide environments in which students have adequate information about the environment on which to base decisions, and in which students do not feel that their sense of competence is personally threatened by public competition, it is more likley that students' motivational beliefs will develop in a direction that supports self-regulation. When the classroom environment also includes academic instruction that fosters knowledge restructuring and development of metacognitive knowledge (through application of the preceding three propositions), a teacher can substantially increase the chances that students will construct important knowledge and increase their capacity for self-regulation.

Conclusion

This chapter has presented the knowledge base about classroom instruction through four organizing ideas that are grounded in a cognitive–mediational perspective on learning and learners, that are supported by research, and that correspond to roles that are familiar to beginning teachers. Although the organizing ideas were discussed separately, they are interrelated in actual classroom teaching.

In order to help beginning teachers learn about the interrelatedness of these four ideas, teacher educators might use cases drawn from specific instructional models designed to promote higher-order learning in content areas (see Brophy, in press; Collins et al., in press; Jones, Palinscar, Ogle, & Carr, 1987). Such instructional programs are valuable for beginning teachers to learn because they integrate the major ideas of the knowledge base, they emphasize the importance of content and curriculum considerations (and how these relate to instructional decisions), and they build on a cognitive–mediational perspective. To learn to teach according to these instructional models requires that teachers understand that students need to recognize links among main ideas (Idea 1), the role of scaffolded dialogue (Idea 2), the importance of tasks and their social context (Idea 3), and the ways that the larger social environment affects students' motivation (Idea 4). Thus, these instructional models, with concrete examples of cooperating teacher models, case studies, videos, and transcripts of lessons, provide an opportunity for teacher educators to link main ideas so that preservice and beginning teachers develop a more integrated personal theory of instruction.

Therefore, learning about the organizing ideas separately is not sufficient to prepare the beginning teacher to deal with classroom complexity. The teacher educator must help the preservice teacher to understand connections among the ideas and to see how they are linked within particular episodes of teaching.

To accomplish this, teacher education should also reflect the principles behind the organizing ideas. Curricula for preservice teachers should be examined for the extent to which students are provided with opportunities to construct integrated knowledge about instruction, to engage in scaffolded dialogue about meaningful and educative tasks with master teachers, and to develop personal beliefs that underlie the development of professionalism and self-determination. Teacher education should model the kind of instruction that promotes higher order learning among K-12 students.

References

Allington, R. L. (1983). The reading instruction provided readers of differing reading abilities. *Elementary School Journal*, **83**, 548–559.

Ames, C. (1984). Achievement attributions and self-instructions under competitive and individualistic goal structures. *Journal of Educational Psychology*, **76**, 478–487.

Ames, C., & Ames, R. (1984). Systems of student and teacher motivation: Toward a qualitative definition. *Journal of Educational Psychology*, **76**, 535–556.

Anderson, C. W. (in press). Subject matter understanding and the role of disciplinary training in teacher preparation.

In A. Woolfolk (Ed.), *Graduate preparation of teachers: Research perspectives*. Englewood Cliffs, NJ: Prentice-Hall.

Anderson, C. W., & Smith, E. L. (1987). Teaching science. In V. Richardson-Koehler (Ed.), *Educator's handbook: A research perspective* (pp. 84–111). New York: Longman.

Anderson, L. M. (in press). Implementing instructional programs to promote meaningful, self-regulated learning. In J. E. Brophy (Ed.), *Advances in research on teaching: Vol. 1. Teaching for meaningful understanding and self-regulated learning*. Greenwich, CT: JAI.

Anderson, L. M., Brubaker, N. L., Alleman-Brooks, J., & Duffy, G. G. (1985). A qualitative study of seatwork in first-grade classrooms. *The Elementary School Journal*, **86**, 123–140.

Anderson, L. M., Stevens, D. D., Prawat, R. S., & Nickerson, J. (1988). Classroom task environments and students' task-related beliefs. *The Elementary School Journal*, **88**, 281–295.

Anderson, R. (1970). Control of student mediating processes during verbal learning and instruction. *Review of Educational Research*, **40**, 349–369.

Ausubel, D. (1968). *Educational psychology: A cognitive view*. New York: Holt, Rinehart, & Winston.

Ausubel, D. (1978). In defense of advance organizers: A reply to the critics. *Review of Educational Research*, **48**, 251–257.

Barnes, B., & Clawson, E. (1975). Do advance organizers facilitate learning? *Review of Educational Research*, **45**, 637–659.

Bennett, N., & Desforges, C. (1988). Matching classroom tasks to students' attainments. *Elementary School Journal*, **88** (3), 221–234.

Bennett, N., Desforges, C. W., Cockburn, A., & Wilkinson, B. (1984). *The quality of pupil learning experiences*. Hillsdale, NJ: Erlbaum.

Bereiter, C., & Scardamalia, M. (1985). Cognitive coping strategies and the problem of "inert knowledge." In S. Chipman, J. Segal, & R. Glaser (Eds.), *Thinking and learning skills: Vol. 2. Current research and open questions* (pp. 65–80). Hillsdale, NJ: Erlbaum.

Berliner, D. C. (1987). Simple theories of effective teaching and a simple theory of classroom instruction. In D. C. Berliner & B. V. Rosenshine (Eds.), *Talks to teachers* (pp. 93–110). New York: Random House.

Berliner, D. C., & Rosenshine, B. V. (Eds.). (1987). *Talks to teachers*. New York: Random House.

Blumenfeld, P. C., Mergendoller, T. R., & Swarthout, D. W. (1987). Task as a heuristic for understanding student learning and motivation. *Journal of Curriculum Studies*, **19**, 135–148.

Borko, H., & Eisenhart, M. (in press). Students' conceptions of reading and their reading experiences in school. *Elementary School Journal*.

Brainin, S. (1985). Mediating learning: Pedagogic issues in the improvement of cognitive functioning. In E. W. Gordon (Ed.), *Review of research in education* (Vol. 12, pp. 121–155). Washington, DC: American Educational Research Association.

Brophy, J. (1983). Conceptualizing student motivation. *Educational Psychologist*, **18**, 200–215.

Brophy, J. (1987). On motivating students. In D. C. Berliner & B. Rosenshine (Eds.), *Talks to teachers* (pp. 201–245). New York: Random House.

Brophy, J. (Ed.) (in press). *Advances in research on teaching: Vol. 1. Teaching for meaningful understanding and self-regulated learning*. Greenwich, CT: JAI.

Brophy, J., & Good, T. (1974). *Teacher-student relationships: Causes and consequences*. New York: Holt, Rinehart, & Winston.

Brophy, J., & Good, T. (1986). Teacher behavior and student achievement. In M. C. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed., pp. 328–375). New York: Macmillan.

Carey, S. (1986). Cognitive science and science education. *American Psychologist*, **41**, 1123–1130.

Champagne, A. B., Klopfer, L. E., & Gunstone, R. F. (1982). Cognitive research and the design of science instruction. *Educational Psychologist*, **17**, 31–53.

Cohen, E. (1987). *Design group work: Strategies for the heterogeneous classroom*. New York: Teachers College Press.

Collins, A., Brown, J. S., & Newman, S. E. (in press). Cognitive apprenticeship: Teaching the craft of reading, writing, and mathematics. In L. B. Resnick (Eds.), *Cognition and instruction: Issues and agendas*. Hillsdale, NJ: Erlbaum.

Cooper, H., & Good, T. (1983). *Pygmalion grows up: Studies in the expectation communication process*. New York: Longman.

Cooper, H. & Tom, D. (1984). Teacher expectation research: A review with implications for classroom instruction. *Elementary School Journal*, **85**, 77–89.

Davis, R. B. (1986). Conceptual and procedural knowledge in mathematics: A summary analysis. In J. Hiebert (Ed.), *Conceptual and procedural knowledge: The case of mathematics* (pp. 265–300). Hillsdale, NJ: Erlbaum.

deCharms, R. (1968). *Personal causation*. New York: Academic Press.

Deci, E. L., & Ryan, R. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum Press.

Doyle, W. (1983). Academic work. *Review of Educational Research*, **53** (2), 159–199.

Doyle, W. (1986). Content representation in teachers' definitions of academic work. *Journal of Curriculum Studies*, **18** (4), 365–379.

Duffy, C., & Roehler, L. (1987). Improving classroom reading instruction through the use of responsive elaboration. *Reading Teacher*, **40** (6), 514–521.

Duffy, G. G., Roehler, L. R., Meloth, M. S., & Vavrus, L. G. (1986). Conceptualizing instructional explanation. *Teaching and Teacher Education*, **2**, 197–214.

Duffy, G. G., Roehler, L. R., & Rackliffe, G. (1986). How teachers' instructional talk influences students' understanding of lesson content. *The Elementary School Journal*, **87** (1), 3–16.

Durkin, D. (1984). Do basal manuals teach reading comprehension? In R. C. Anderson, J. Osborn, & R. J. Tierney (Eds.), *Learning to read in American schools* (pp. 29–38). Hillsdale, NJ: Erlbaum.

Dusek, J. (Ed.). (1985). *Teacher expectancies*. Hillsdale, NJ: Erlbaum.

Eccles, J., Midgley, C., & Adler, T. (1984). Age-related environmental changes and their impact on achievement behavior. In J. G. Nicholls (Ed.), *The development of achievement motivation* (pp. 283–331). Greenwich, CT: JAI.

Eder, D. (1981). Ability grouping as self-fulfilling prophecy: A microanalysis of teacher–student interaction. *Sociology of Education*, **54**, 151–161.

Englert, C. S. & Raphael, T. E. (in press). Developing successful writers through cognitive strategy instruction. In J. E. Brophy (Ed.), *Advances in research on teaching: Vol. 1. Teaching for meaningful understanding and self-regulated learning*. Greenwich, CT: JAI.

Evertson, C. (1989). Classroom organization and management. In M. C. Reynolds (Ed.), *Knowledge base for the beginning teacher*. New York: Pergamon.

Fennema, E., Carpenter, T. P., & Peterson, P. L. (in press). Learning mathematics with understanding. In J. Brophy (Ed.), *Advances in research on teaching: Vol. 1. Teaching for meaningful understanding and self-regulated learning*. Greenwich, CT: JAI.

Gagne, R., & Briggs, L. (1987). *Principles of instructional design* (2nd ed.). New York: Holt, Rinehart, & Winston.

Good, T. L. (1980). Classroom expectations: Teacher-pupil interactions. In J. McMillan (Ed.), *The social psychology of school learning* (pp. 79–122). New York: Academic Press.

Good, T. L. (1987). Teacher expectations. In D. C. Berliner & B. Rosenshine (Eds.), *Talks to teachers* (pp. 159–200). New York: Random House.

Good, T. L., & Marshall, S. (1984). Do students learn more in heterogeneous or homogeneous groups? In P. Peterson, L. Cherry-Wilkinson, & M. Halliman (Eds.), *The social context of instruction* (pp. 15–38). New York: Academic Press.

Goodlad, J. I. (1984). *A place called school*. New York: McGraw-Hill.

Hiebert, E. (1983). An examination of ability grouping in reading instruction. *Reading Research Quarterly*, **18** (2), 231–255.

Hiebert, J. (Ed.). (1986). *Conceptual and procedural knowledge: The case of mathematics*. Hillsdale, NJ: Erlbaum.

Hiller, J., Fisher, G., & Kaess, W. (1969). A computer investigation of verbal characteristics of effective classroom lecturing. *American Educational Research Journal*, **6**, 661–675.

Hunter, M. (1982). *Mastery teaching*. El Segundo, CA: TIP Publications.

Jones, B. F., Palinscar, A. S., Ogle, D. S., & Carr, E. G. (Eds.). (1987). *Strategic teaching and learning: Cognitive instruction in the content areas*. Alexandria, VA: Association of Supervision and Curriculum Development.

Lampert, M. (in press). Choosing and using mathematical tools in classroom discourse. In J. E. Brophy (Eds.), *Advances in research on teaching: Vol. 1. Teaching for meaningful understanding and self-regulated learning*. Greenwich, CT: JAI.

Langer, J. A. (1981). From theory to practice: A pre-reading plan. *Journal of Reading*, **25**, 152–156.

Langer, J. A. (1984a). Examining background knowledge and text comprehension. *Reading Research Quarterly*, **19**, 468–481.

Langer, J. A. (1984b). Literacy instruction in American schools: Problems and perspectives. *American Journal of Education*, **93**, 107–132.

Langer, J. A., & Applebee, A. N. (1986). Reading and writing instruction: Toward a theory of teaching and learning. In E. Rothkopf (Eds), *Review of Research in Education* (Vol. 13, pp. 171–194). Washington, DC: American Educational Research Association.

Madsen-Nason, A., & Lanier, P. (1986). *Pamela Kaye's general math class: From a computational to a conceptual orientation* (Research Series No. 172). East Lansing: Michigan State University, Institute for Research on Teaching.

Marshall, H. H., & Weinstein, R. S. (1984). Classroom factors affecting students' self-evaluations: An interactional model. *Review of Educational Research*, **54**, 301–325.

Marshall, H. H. & Weinstein, R. S. (1985, April). *"It's not how much brains you've got, it's how you use it": A comparison of classrooms expected to enhance or undermine students' self-evaluations*. Paper presented at the annual meeting of the American Educational Research Association, Chicago.

Marx, R. W., & Walsh, J. (1988). Learning from academic tasks. *Elementary School Journal*, **88** (3), 207–219.

Mayer, R. (1979). Can advance organizers influence meaningful learning? *Review of Educational Research*, **49**, 371–383.

McDiarmid, W., Ball, D., & Anderson, C. (1989). Subject specific pedagogy. In M. Reynolds (Ed.), *Knowledge base for the beginning teacher* (pp.193–205). New York: Pergamon.

Meece, J. L., & Blumenfeld, P. C. (in press). Elementary school children's motivational orientation and patterns of engagement in classroom activities. *Journal of Educational Psychology*.

Nicholls, J. G. (1979). Quality and equality in intellectual development: The role of motivation in education. *American Psychologist*, **34**, 1071–1083.

Nicholls, J. G. (1983). Conceptions of ability and achievement motivation: A theory and its implications for education. In S. G. Paris, G. M. Olson, & H. W. Stevenson (Eds.), *Learning and motivation in the classroom* (pp. 211–237). Hillsdale, NJ: Erlbaum.

Olson, J. (1983). Guide writing as advice giving: Learning the classroom language. *Journal of Curriculum Studies*, **15**, 17–26.

Palinscar, A. S. (1986). The role of dialogue in providing scaffolded instruction. *Educational Psychologist*, **21**, 73–98.

Palincsar, A. S. & Brown, A. L. (1984). Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities. *Cognition and Instruction*, **1**, 117–175.

Palincsar, A. S., & Brown, A. L. (in press). Classroom dialogues to promote self-regulated comprehension. In J. Brophy (Ed.), *Advances in research on teaching: Vol. 1. Teaching for meaningful understanding and self-regulated learning*. Greenwich, CT: JAI.

Pearson, P. D., & Dole, J. A. (1987). Explicit comprehension instruction: A review of research and a new conceptualization of instruction. *The Elementary School Journal*, **88** (2), 151–165.

Perrot, E. (1982). *Effective teaching: A practical guide to improving your teaching*. New York: Longman.

Peterson, P., & Swing, S. (1982). Beyond time-on-task: Students' reports of their thought processes during classroom instruction. *Elementary School Journal*, **82**, 481–491.

Posner, G. J., Strike, K. A., Hewson, P. W., & Gertzog, W. A. (1982). Accommodation of a scientific conception: Toward a theory of conceptual change. *Science Education*, **66**, 211–228.

Resnick, L. B. (1985). Instructional psychology. In T. Husen & T. Postlethwaite (Eds.), *International encyclopedia of education: Research and studies* (Vol. 5, pp. 2569–2581). Oxford and New York: Pergamon.

Resnick, L. B. (1987). *Education and learning to think*. Washington, DC: National Academy Press.

Roehler, L., & Duffy, G. G. (in press). Teachers' instructional

actions. In P. D. Pearson (Ed.), *Handbook of reading research* (Vol. 2). New York: Longman.

Roehler, L. R., Duffy, G. G., Conley, M., Herrmann, B. A., Johnson, J., & Michelson, S. (1987, April). Exploring preservice teachers' knowledge structures. Paper presented at the annual meeting of the American Educational Research Association, Washington, DC.

Rosenholtz, S. J., & Wilson, B. (1980). The effects of classroom structure on shared perceptions of ability. *American Educational Research Journal*, **17**, 175–182.

Rosenshine, B. (1971). *Teaching behaviours and student achievement*. Slough: National Foundation for Educational Research.

Rosenshine, B. (1987). Explicit teaching. In D. C. Berliner & B. Rosenshine (Eds.), *Talks to teachers* (pp. 75–92). New York: Random House.

Rosenshine, B., & Stevens, R. (1986). Teaching functions. In M. C. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed., pp. 376–391). New York: Macmillan.

Roth, K. J., Anderson, C. W., & Smith, E. L. (1987). Curriculum materials, teacher talk and student learning: Case studies in fifth grade science teaching. *Journal of Curriculum Studies*, **19**, 527–548.

Ryan, R. M., Connell, J. P., & Deci, E. L. (1985). A motivational analysis of self-determination and self-regulation in education. In E. Ames & R. Ames (Eds.), *Research on motivation in education: The classroom milieu*. (Vol. 2, pp. 13–51). New York: Academic Press.

Scardamalia, M., & Bereiter, C. (1985). Fostering the development of self-regulation in children's knowledge processing. In S. Chipman, W. Segal, & R. Glaser (Eds.), *Thinking and learning skills: Research and open questions* (Vol. 2, pp. 563–577). Hillsdale. NJ: Erlbaum.

Schoenfeld, A. H. (1985). *Mathematical problem solving*. New York: Academic Press.

Shulman, L. S. (1986). Paradigms and research programs in the study of teaching: A contemporary perspective. In M. C. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed., pp. 3–36). New York: Macmillan.

Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, **57**, 1–22.

Simon, H. (1978). Information processing theory of human problem solving. In W. K. Estes (Ed.), *Handbook of learning and cognitive processes* (Vol. 5, pp. 273–295). Hillsdale, NJ: Erlbaum.

Sirotnik, K. A. (1983). What you see is what you get. *Harvard Educational Review*, **54**, 16–32.

Smith, L. R., & Cotton, M. L. (1980). Effect of lesson vagueness and discontinuity on student achievement and attitudes. *Journal of Educational Psychology*, **72**, 670–675.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman, Eds. and Trans.). Cambridge: Harvard University Press.

Wertsch, J. (1979). From social interaction to higher psychological processes: A clarification and application of Vygotsky's theory. *Human Development*, **22**, 1–22.

Whitehead, A. (1929). *The aims of education*. New York: Macmillan.

Wood, D. J., Bruner, J. S., & Ross, G. (1976). The role of tutoring in problem-solving. *Journal of Child Psychology and Psychiatry*, **17** (2), 89–100.

Annotated Bibliography

Berliner, D. C., & Rosenshine, B. V. (Eds.). (1987). *Talks to teachers*. New York: Random House. This book is a collection of research-based essays by the students and colleagues of Nathaniel Gage. Included in the volume are papers on the enterprise of educational research, classroom discourse, classroom management, explicit teaching, gender differences, teacher expectations, student motivation, student thinking, testing, and teacher planning. All chapters are written by researchers in the area and represent recent summations of classroom-based research.

Brophy, J. (Ed.). (in press). *Advances in research on teaching: Vol. 1: Teaching for meaningful understanding and self-regulated learning*. Greenwich, CT: JAI. This book presents current work in the development and study of teaching methods that promote meaningful understanding of subject matter and development of self-regulation of learning. Chapters address teaching of science, math, reading, and writing.

Brophy, J., & Good, T. L. (1986). Teacher behavior and student achievement. In M. C. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed., pp. 328–375). New York: Macmillan. Brophy and Good review the large body of research on the relationship between teaching practice and student achievement. They begin with an historical overview of the field, then delineate in some detail the major research efforts conducted in the 1970s on teacher behavior and student achievement. The authors conclude with a summary and synthesis of findings and sections on methodological issues and future research.

Collins, A., Brown, J. S., & Newman, S. E. (in press). Cognitive apprenticeship: Teaching the craft of reading, writing, and mathematics. In L. B. Resnick (Ed.), *Cognition and instruction: Issues and agendas*. Hillsdale, NJ: Erlbaum. The authors argue for a method of instruction for teaching cognitive processes and strategies that resembles the traditional apprenticeship. They examine three successful models of cognitive apprenticeship (i.e., Palinscar and Brown's reciprocal teaching of reading comprehension, Scardamalia and Bereiter's procedural facilitation of writing, and Schoenfeld's methods of teaching mathematical problem solving) and end with a framework for constructing and evaluating learning environments according to four dimensions: content, methods, sequence, and sociology.

Doyle, W. (1983). Academic work. *Review of Educational Research*, **53**, 159–199. In this article Doyle examines the cognitive processes required by different types of school tasks. He then considers the role of direct or indirect instruction in preparing students for tasks. In the second section, Doyle reviews studies that examine how academic work is accomplished in classrooms, focusing on issues of management and accountability. He concludes with descriptions of ways that students invent and use strategies for managing the ambiguity and risk associated with school tasks, thereby affecting the nature and quality of academic work.

Jones, B. F., Palinscar, A. S., Ogle, D. S., & Carr, E. G. (Eds.). (1987). *Strategic teaching and learning: Cognitive instruction in the content areas*. Alexandria, VA: ASCD. This book addresses the need to teach higher-order thinking skills in specific content domains to all students. Part I presents a framework for teacher planning for strategic

teaching, including preparing for learning, presentation of content, and application and integration. In Part II, content area specialists discuss how the general framework proposed by the editors in Part I can be used in the particular content area and the adaptations needed, if any, to reach all students.

Langer, J. A., & Applebee, A. N. (1986). Reading and writing instruction: Toward a theory of teaching and learning. In E. Rothkopf (Eds.), *Review of research in education* (Vol. 13, pp. 171–194). Washington, DC: American Educational Research Association. In an effort to counter the tendency of researchers to focus only on individual development or instruction, the authors review research that contributes to a general theory of learning and instruction in reading and writing. First they review the research on adult–child interactions (frequently mother–child dyads), referred to as "scaffolded instruction," in areas such as early language learning, sorting and classification tasks, and completion of puzzles. Next they review studies of instructional scaffolding in educational settings. They conclude with an examination of the five components of effective instructional scaffolding and discuss each characteristic in terms of how it relates to earlier reviewed studies of parent–child interactions and how it matches current classroom practice.

Resnick, L. B. (1985). Instructional psychology. In T. Husen & T. N. Postlethwaite (Eds.), *International encyclopedia of education: Research and studies* (Vol. 5, pp. 2569–2581). Oxford and New York: Pergamon. Resnick offers a brief history of instructional psychology, showing how the shifts in the field parallel those in the field of psychology at large, moving from behavioral to cognitive theories of learning. Next Resnick focuses on cognitive research in areas of particular relevance to school learning: reading comprehension, mathematics, science, and problem solving. She then describes the influence of cognitive theory on conceptions of intelligence and aptitude and concludes with a discussion on how to link instructional psychology to practical concerns about schooling.

Rosenshine, B., & Stevens, R. (1986). Teaching functions. In M. C. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed., pp. 376–391). New York: Macmillan. Rosenshine and Stevens summarize direct instructional models based on research in the "process–product" tradition. They cite particular studies and describe in detail each of the steps in a general model of instruction: daily review, presentation, guided practice, correction and feedback, independent practice, and weekly and monthly review.