The Metaphor of Scaffolding: Its Utility for the Field of Learning Disabilities

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Abstract

Over the past 20 years, an increasing number of psychologists and educators have used the notion of scaffolding as a metaphor for the process by which adults (and more knowledgeable peers) guide children's learning and development. The purpose of the present article is to provide a critical analysis of the scaffolding metaphor, with particular emphasis on its applications to the case of atypical learners. In the initial sections of the article, the origins and early applications of the metaphor are sketched. With this as background, criticisms of the metaphor raised by others are reviewed, and a proposal for an enriched version of the metaphor is presented. At the heart of the proposed revision is an emphasis on the communicational dynamics and conceptual reorganization involved in adult–child interactions. With an enriched metaphor as a frame, the next section reviews applications of the scaffolding metaphor to the study of parent–child interactions and teacher–student instructional activities involving children with learning disabilities. The strengths and limitations of this work are evaluated, and proposals are made for how to reap further benefits from applications of the scaffolding metaphor to analyses of the development and instruction of children with learning disabilities.

When scholars are grappling with understanding a phenomenon, they often turn to metaphors for help. By casting the unknown in terms of the known, metaphors help us to conceptualize complex relations. A good metaphor, however, is more than a novel label or a graphic description of a phenomenon. If it has been aptly chosen, a metaphor can help us to appreciate as yet unanticipated connections or consequences. In this latter sense, a metaphor is not so much descriptive as it is generative of new ideas. The history of the sciences is rich with examples of metaphors that have contributed to new understandings. However, as has often been pointed out, the use of a metaphor in theory building is not without its risks. Metaphors can be both too strong and too weak. A metaphor is too strong if it leads us to assume properties or connections where none exist; a metaphor is too weak if its image fails to map onto what hindsight reveals to be crucial aspects of a new phenomenon, thus hindering our realization of the true dimensions of the phenomenon. Thus, when a new metaphor gains prominence in a discipline, it is important to give it both proper respect and proper scrutiny.

In recent years, the field of learning disabilities has seen increasing use of the metaphor of "scaffolding" in discussions of instructional innovations. In providing temporary assistance to children as they strive to accomplish a task just out of their competency, adults are said to be providing a scaffold, much like that used by builders in erecting a building. Such a metaphor has certain appeal. It connotes a custom-made support for the "construction" of new skills, a support that can be easily disassembled when no longer needed. It also connotes a structure that allows for the accomplishment of some goal that would otherwise be either unattainable or quite cumbersome to complete. As we will see, the scaffolding metaphor also creates instant links to a theoretical and empirical tradition within the field of developmental psychology that brings with it, for better or worse, a good deal of theoretical baggage.

My purpose in writing this article was to raise some questions about the uses to which we are putting the metaphor of scaffolding in the field of learning disabilities. My intention was not to be critical; rather, I hoped to achieve some clarity regarding both the promises and the pitfalls of the metaphor. In this way, we can make optimal use of what may prove to be a fruitful tool in advancing our awareness of both the origins of certain aspects of the various learning disability syndromes and the instructional dynamics needed to bring about productive learning in children with learning disabilities.

Origins of the Metaphor

The term *scaffolding* is often linked in current discussions to the theories

of the Soviet psychologists Vygotsky and Luria. Although the writings of these men were undoubtedly a major impetus for the metaphor, in fact neither theorist used the term. Instead, the first extended treatment of the metaphor seems to be in a paper by Wood, Bruner, and Ross (1976). Those authors used the metaphor as an analytic device to aid in understanding the functional role of the support provided to young children by their parents during joint problem-solving activities. In a series of papers dating from approximately the same time period, Bruner also applied the metaphor to the context of parent–infant communication exchanges pre-dating and facilitating the onset of language use (e.g., Bruner, 1975).

Wood et al. (1976) described scaffolding as a form of adult assistance "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). The process was seen as involving the adult's " 'controlling' those elements of the task that are initially beyond the learner's capacity, thus permitting him to concentrate upon and complete only those elements that are within his range of competence" (p. 90). The authors emphasized, however, that much more was at stake than merely completing the task. Instead, successful scaffolding was assumed to result in a better understanding on the part of the child of what was involved in successful completion of the task. That is, a genuine change in understanding had been accomplished, not merely some end state (e.g., a completed block tower). Thus, unlike our everyday notion of scaffolding, in which the same apparatus would be needed each time one set out to construct a similar building, in Wood et al.'s metaphoric usage, it would be assumed that over time, there would be less and less need for scaffolding to accomplish the same task. That is, what was being scaffolded was not the completion of a specific task but, rather, the child's understanding of how to conceptualize the task and of the proper sequence of steps toward its accomplishment.

For scaffolding to be successful, a child must enter an exchange with some prior understanding of what was to be accomplished (e.g., the building of a tower, the communication of an intent; Wood et al., 1976). What the scaffolding allowed to take place was a growing appreciation of a new procedure (e.g., an assembly "strategy," an utterance type) to accomplish that end. In Wood et al.'s terms, "comprehension of the solution must precede production" (p. 90). The child's new understanding of how to accomplish the goal is achieved via an ongoing interaction in which the adult provides carefully calibrated assistance at the child's leading edge of competence. Wood et al. identified six types of assistance the adult tutor could provide: recruitment of the child's interest, reduction in degrees of freedom, maintaining goal orientation, highlighting critical task features, controlling frustration, and demonstrating idealized solution paths. Although the authors did not stress this fact, it is important to note for the discussion to follow that this list includes perceptual components (e.g., highlighting task features); cognitive components (e.g., reducing degrees of freedom); and affective components (e.g., controlling frustration). It is also important to note that although the authors had little to say about the actual mechanism by which children benefited from scaffolding, they hinted at a process of recognizing and imitating more advanced solution models. Some elaboration of this process was provided by Wood and colleagues in a companion paper (Wood, Wood, & Middleton, 1978), which did not explicitly use the scaffolding metaphor.

Evolution of the Metaphor

Although initial use of the scaffolding metaphor was largely pragmatic and atheoretical, in subsequent discussions it was increasingly linked with Vygotsky's (1962, 1978) developmental theory. As mentioned above, the original use of the metaphor was proposed by Wood et al. (1976) without any explicit reference to Vygotsky. However, Bruner (1962), who wrote the introduction to the first English translation of Vygotsky's (1962) *Thought and Language*, was undoubtedly influenced by Vygotsky's notion of the zone of proximal development (ZPD) in his thinking about this matter. This implicit link between Vygotsky's ZPD and the scaffolding metaphor was first made explicit by Cazden (1979). Since that time, the link between ZPD and the scaffolding metaphor has been explicitly acknowledged by the original developers of the metaphor (e.g., Bruner, 1986; Wood, 1988). In her paper, Cazden also extended the metaphor from its original use in the context of dyadic adult–child interactions to an analysis of teacher–student interactions in classroom settings. Just as parents use language games and turn-taking as temporary scaffolds for their children's early language use and problem-solving activity, she argued, teachers use repeating question–answer sequences in classroom lessons as scaffolds for their students' mastery of the implicit participation structures of classroom discourse. Thus, Cazden argued, adults scaffold children's learning in a broad array of situations, and Vygotsky's notion of the adult–child interactions in the ZPD would provide an analytic link in understanding these dynamics.

In the late 1970s and the 1980s, the metaphor of scaffolding was used by a number of scholars in the field of developmental psychology, both in theory-building and in empirical studies of adult–child interaction. Its increasing use reflected a growing disenchantment with what might be called the individual-child-learner model of development made popular by followers of Piaget (e.g., Inhelder & Chipman, 1976). In its place was a renewed interest in the role that adult assistance played in children's devel-

opment—an interest fueled in part by the wider availability of Vygotsky's ideas in English (Vygotsky, 1962, 1978; Wertsch, 1985). Vygotsky's (1962, 1978) idea of the ZPD provided new conceptual tools for thinking about the influence of adult–child interactions on children's development. In addition, Wood et al.'s (1976) analysis of the scaffolding process, as well as some operationalizations of Vygotsky's ideas (e.g., Wertsch, 1979), provided new methodological tools for analyzing adult–child interactions. During this period, a number of empirical studies of adult–child interaction were published, several of which were motivated explicitly by the scaffolding metaphor. In the following sections, I will briefly review examples of these studies. My purpose here is not to provide a comprehensive summary of this work, but, rather, to illustrate the ways in which the scaffolding metaphor has been used. I have divided the work into two categories: studies of parent–child interaction and studies of teacher–student interaction. For the most part, the studies cited represent work carried out by developmental and educational psychologists using normally developing children; however, some studies using special samples are also mentioned. Other applications of the scaffolding metaphor to exceptional populations and special education settings are discussed in more detail later in the article. In choosing examples of each category, I have tried to choose studies that highlight interesting features of the scaffolding metaphor or provide useful operationalizations.

Studies of Parent–Child Interaction

The majority of the initial studies of scaffolding were, like Bruner's (1975) early language-acquisition work, descriptive studies of quasi-natural parent–child interactions. In these studies, the participants either were brought into a research setting and asked to participate in a task assigned by the researcher (e.g., putting together a puzzle, categorizing objects), or were asked to engage in a "typical" activity while the researcher observed (e.g., reading a storybook, weaving). Although such studies occasionally contrasted the interactions involving children of different ages, no explicit attempt was made to manipulate the nature of the tasks, or to specify or constrain the nature of the interaction.

In the context of a general discussion of the value of the scaffolding metaphor in understanding children's development, Greenfield (1984) summarized two series of studies that she and her students conducted. In the first set of studies, Greenfield focused on the role of parental assistance in helping young children to comprehend adult question forms. The researchers identified episodes from videotapes of home interactions in which parents made a verbal offer to their child (e.g., "Do you want to talk to Daddy?" [on a toy telephone]), which the child failed to comprehend initially but whose corresponding action the child was eventually successful in executing (with the parent's guidance). Greenfield then analyzed the sequence of adult guidance used to assist the child in understanding the question. In her analysis, she placed emphasis on the ways in which parents act out substeps of the intended activity in response to an inferred lack of comprehension on the child's part. Thus, when the child failed to respond to the telephone query quoted above, the mother acted out parts of the talking-on-the-telephone sequence, encouraging the child to participate after each segment. Greenfield noted that via this guidance, the child came to understand the meaning of the original question.

In the same article, Greenfield (1984) provided a similar analysis of mothers in a rural area of southern Mexico who were helping their daughters learn to weave. Analyses of the relation between a child's previous weaving experience within and across sessions and the amount of adult assistance provided were used to illustrate the ways in which maternal scaffolding was calibrated to the child's needs. For example, Greenfield reported that the frequency of multimodal assistance from the mother (a combination of verbal directions and nonverbal modeling and guidance) decreased steadily, and the frequency of verbal-only assistance increased, as a function of the child's increased experience with weaving. In addition, the mothers used increasingly more indirect verbal statements, as opposed to direct commands, as each session proceeded.

A second example of the descriptive studies of parental scaffolding is Hodapp, Goldfield, and Boyatzis's (1984) study. These authors studied the interactions of 17 mother–infant dyads during turn-taking games at monthly intervals from ages 8 months to 16 months. This is one of the few longitudinal studies of scaffolding available. The analyses focused on two main predictions of the scaffolding metaphor: that maternal assistance is calibrated to the infant's need, and that the scaffolding does indeed aid the infant in skill mastery. With respect to the first issue, analyses of the videotapes indicated that mothers provided more structure for infants during the early phases of game-learning (e.g., holding out hands during "roll the ball" to signal readiness to catch the infant's roll, vocalizing while hiding to aid the infant's attention during peekaboo). These aids decreased in frequency with increasing evidence of infant mastery. With respect to the second issue (the effectiveness of scaffolding), the authors reported that during the early months of the interactions, infants were more likely to roll the ball when mothers held out their hands than when they did not, suggesting that the maternal gesture cued the appropriate next step in the game. In addition, the authors found that infants reliably demonstrated specific target skills (e.g., finding mother when she is hidden) in the game context at least 1 month before demonstrating the skill in new, less interactive contexts (e.g., in the Piaget object-

permanence task), suggesting that the scaffolding did indeed result in meaningful learning of new skills.

In contrast to the descriptive parent–child scaffolding studies such as those described above, a second group of studies was characterized by some experimental manipulation of the interaction. The purpose of these studies was to explore the importance of various hypothesized components of the scaffolding process by manipulating their presence or intensity. The earliest example of this type of study was provided by Wood et al. (1978), one of the originators of the scaffolding metaphor. The major value of the Wood et al. study is that it provided the first experimental operationalization of the notion of scaffolding, termed, in this case, *contingent instruction*. Thirty-two 3-year-old children worked individually with an adult to put together a block-tower puzzle similar to that used by Wood et al. (1976). Each child was assigned to one of four conditions (n = 8 in each group) that differed in the extent to which the instruction provided by the experimenter was linked to the child's ongoing task performance. In all conditions, the experimenter drew upon a hierarchy of five increasingly more explicit means of helping the child complete the puzzle. In the Contingent Instruction group, the experimenter "diagnosed" the child's level of success with each puzzle piece and provided, on the next piece, assistance that was either one level more directive or one level less directive than the assistance provided on the preceding piece. The other conditions all involved less carefully titrated assistance, ranging from all assistance at the most explicit level (Demonstration condition) to assistance that alternated automatically between the most and least explicit levels from piece to piece, regardless of the child's success with the preceding piece (Swing condition). The authors found, as they had predicted, that the children in the Contingent condition performed significantly better than the children in the other three conditions in a subsequent work-alone trial with the same puzzle. It should be noted, however, that there was no assessment of preinstruction work-alone skill level, and thus the results are ambiguous.

A more recent study involving the experimental manipulation of the scaffolding process was reported by Pacifici and Bearison (1991). These authors compared the performance of 29 three-year-old children on a set of puzzles before and after a session involving different types of adult assistance with a similar puzzle. Following pretesting with the transfer puzzles, children were randomly assigned to one of two groups. In the first group (n = 9), the children were asked to assemble a simple jigsaw-like puzzle so that it matched a model puzzle. They worked with their mothers, who were told that they could help their children when they thought it was necessary. In the second group (n = 20), the children worked with an adult experimenter who provided assistance as a function of the child's moment-to-moment success at inserting puzzle pieces. The assistance was calibrated according to an a priori hierarchy of increasingly explicit prompts. Analyses of the adult assistance provided to the children indicated that the mothers provided a high proportion of appropriately contingent assistance, but that the experimenter-directed assistance was appropriately contingent at a significantly higher frequency. In addition, the authors reported that although the children in both groups made significant improvement in successfully completing the transfer puzzle, the children in the experimental group made significantly more progress. These findings were interpreted as providing support for the assumption that calibrated assistance of the type theoretically involved in scaffolding does indeed result in greater learning.

An interesting refinement of the experimental paradigm exemplified in the above studies was reported by Day and Cordon (1993). Those authors conducted an experimental comparison of the effectiveness of scaffolded and nonscaffolded instruction in helping third graders (n = 32 in each of the two groups) to master a balance-scale task adapted from Siegler's (1976) work. As in earlier studies, the two instructional conditions varied in the extent to which the assistance provided by the experimenter was calibrated to the child's immediately preceding behavior. The unique feature of Day and Cordon's study was the inclusion of three measures of child characteristics: impulsivity, achievement orientation or independence, and verbal intelligence. Two important findings were evident. First, the scaffolded instruction resulted in faster learning and better maintenance of learning, even when the individual-difference measures were used as covariates. Second, there were some indications that the individual-difference factors played a greater role in predicting learning success for the children who did not receive the scaffolded instruction. The latter finding suggests that scaffolded instruction either is sensitive to or compensates for certain characteristics known to relate to school success in general.

Studies of Teacher–Student Interaction

Although the original discussion of scaffolding published by Wood et al. (1976) was actually an observational study of an expert teacher interacting with children, the majority of the subsequent studies of scaffolding for several years focused on parent–child rather than teacher–student interactions. Cazden (1979) argued early on that the scaffolding metaphor held promise for the analysis and design of classroom instruction; however, it was not until the mid-1980s that studies of classroom interactions informed by the scaffolding metaphor began to appear.

The majority of these early studies were observational in nature, often involving the application of the scaffolding metaphor to a corpus of classroom

interaction collected within another theoretical framework. (See Lehr, 1985, for a brief overview of some of this work.) Cazden's (1979) original analysis was of this nature and still represents one of the best analyses of the parallelism between the scaffolding exchanges in parent–child interactions and the dynamics of teacher–student interactions in the classroom. Cazden looked, in particular, at parallels between the parent–child language games described by Ninio and Bruner (1978) and the prototypical dialogue structure characteristic of classroom instruction (Mehan, 1979).

A second set of pioneers in the exploration of scaffolding as a metaphor for classroom instruction were Applebee and Langer (Applebee, 1983; Langer & Applebee, 1986). Like Cazden, these authors used extended examples of classroom dialogues to argue for the importance of instructional dynamics similar to the adult–child interactions studied by Bruner (1975), Wood et al. (1976, 1978), and others. Langer and Applebee (1986) identified five components of what they saw as effective instructional scaffolding: *ownership* (of the activity to be learned), *appropriateness* (to the student's current knowledge), *structure* (embodying a "natural" sequence of thought and action), *collaboration* (between teacher and student), and *internalization* (via gradual withdrawal of the scaffolding and transfer of control). They illustrated these features with both positive and negative examples from classroom interactions studied by themselves and others.

Fleer (1992) provided a similar conceptual analysis of scaffolded instruction in the context of science instruction. Using examples from the lesson transcripts of three very different teachers, Fleer argued that science instruction that effectively fosters new conceptual understanding is characterized by the establishment of mutual understanding between teacher and students in a clear, shared, goal-oriented context. In addition, Fleer argued that the effective teacher works together with the students in a cognitively oriented fashion and encourages the handover of new understandings to the students. These features bear considerable similarity to those identified by Applebee and Langer (Applebee, 1983; Langer & Applebee, 1986) for literacy instruction.

The most extensive and well-known application of the scaffolding metaphor to teacher–student interactions is the research program of Palincsar and Brown (1984; Palincsar, 1986, 1991). In that work, these authors have refined a method, termed *reciprocal teaching*, for instilling active comprehension skills in children who have proven to be at risk for language comprehension problems. Although the work was built in part on past work (by Brown, Campione, & Day, 1981) on cognitive strategy training, one of its unique features was the explicit use of the scaffolding metaphor to motivate strategy training that was much more interactive and child-sensitive than past training approaches. The findings of Palincsar and Brown, and of others, have demonstrated that the reciprocal teaching approach is an effective means of improving children's comprehension skills.

The central feature of reciprocal teaching is a repeating sequence in which teacher and students take turns being responsible for carrying out a set of strategies for summarizing, questioning, clarifying, and predicting successive segments of a text as an aid to ongoing comprehension of the text. In the early phases of the interaction, the teacher carries the primary responsibility for successfully executing the strategies, via explicit modeling and highly structured feedback. Gradually, however, he or she encourages the students to take a greater responsibility for strategy execution. Through this process, students adopt the more active and strategic approach to comprehension embodied in the activities demonstrated and supported by the teacher's scaffolding.

This approach has been implemented in dyadic, small-group (remedial reading groups), and intact-classroom settings. It has been evaluated via both single-subject and comparative group designs. Its success at improving reading comprehension has been demonstrated with "near" measures of strategy use and text comprehension immediately following the training and with "far" measures of performance on standardized reading comprehension tests 2 or more months later.

Palincsar and Brown (1984) stated that the effectiveness of reciprocal teaching was undoubtedly due in part to the particular combination of comprehension strategies incorporated into the lessons, and to the extensiveness of the interventions (e.g., 20 days of lessons), but they also emphasized the important role of what they called scaffolded instruction. In discussing the power of scaffolding, they emphasized the importance of several features, including (a) the goal-embeddedness of the activity, which provides motivation; (b) the active involvement of the students, enforced via turn-taking, which facilitates both practice and teacher awareness of students' skill levels; (c) the online diagnosis and accompanying calibration of support carried out by the teacher (Palincsar & Brown, 1984); and (d) the ongoing teacher–student dialogues, which serve the role of facilitating teacher–student collaboration (Palincsar, 1986).

The work by Palincsar and Brown (1984) represents a thoughtful and effective attempt in the field of educational psychology to apply the scaffolding metaphor to the analysis and design of classroom instruction. Another frequently cited example is the work of Englert and colleagues (Englert, 1992; Englert, Raphael, Anderson, Anthony, & Stevens, 1991). In addition, there are others who have linked their work to the notion of scaffolding, either explicitly (e.g., Sowers, 1985) or with only passing mention of the relevance of the metaphor to work that was otherwise not motivated directly by it (e.g., Borkowski, 1992; Paris & Brynes, 1989).

The Evolved Meaning of the Metaphor

As the discussions and applications of the scaffolding metaphor evolved during the 1980s, a commonly accepted set of characteristics of it became evident. Four key features can be identified. First, a scaffolding interchange involved the recruitment by an adult of a child's involvement in a meaningful and culturally desirable activity beyond the child's current understanding or control. Most often, it was assumed that the goal of the activity was understood and valued by the child, though it was beyond his or her level of individual competency. The second critical feature of the accepted metaphor was the titration of the assistance provided by the adult during the interaction. This titration was accomplished via a process of "online" diagnosis of the child's understanding and/or skill level, together with careful calibration of the support provided to help him or her accomplish the goal or subgoal.

A third feature of scaffolded interactions was that the adult could provide a range of types of support. Depending on the nature of the task, the repertoire of useful assistance might include nonverbal assistance—such as modeling or pointing—in the accomplishment of an overt physical task (e.g., completing a puzzle; Wood et al., 1976), but it might also include extensive dialogue, as in reciprocal teaching (Palincsar, 1986). The fourth and final feature of the scaffolding metaphor was that the support the adult provided was assumed to be temporary and was gradually withdrawn, in order to foster a transfer of responsibility from the adult to the child.

It will probably not be lost on the reader that the accepted features of scaffolding that emerged from a decade of theory and research are not that different from those proposed by Wood et al. (1976). This fact speaks to the thoughtfulness of the metaphor's originators. Although later scholars have provided useful elaborations, the original characterization of the metaphor captured important and fruitful dynamics of adult–child interactions.

Perhaps the most important elaboration of the original metaphor was the explicit linkage of the dynamics captured by the metaphor with Vygotsky's (1962, 1978) developmental theory. As I noted earlier, this connection was undoubtedly not lost on the originators of the metaphor; however, it was left to others—most notably, perhaps, Cazden (1979)—to make the connection explicit and to play out the implications of the connection. By far the most important connection was the link to Vygotsky's notion of the zone of proximal development, with its clear implication that not only the isolated learning of new concepts and procedures but also genuine conceptual reorganization results from scaffolded interactions. Thus, scaffolding came to be seen as a metaphor for learning in both the narrow and the broad sense.

Evaluating the Scaffolding Metaphor

Ironically, the connection of the scaffolding metaphor to Vygotsky's (1962, 1978) sociocultural perspective on learning and development served as both an enrichment of the metaphor's meaning and the seed of some dissatisfaction with the metaphor. In the present section, I will characterize the nature of that dissatisfaction; following that discussion, I consider whether these concerns justify abandoning the metaphor.

Criticisms of the Metaphor

As careful consideration of the sociocultural perspective made scholars increasingly sensitive to the cultural context of children's learning and development, a number of concerns about the scaffolding metaphor began to emerge. One important impetus for these concerns was a growing awareness of cultural differences in child-rearing and educational practices. Indeed, at a general level, several of the concerns about to be discussed are instances of a general point made by a number of authors, namely, that the original meaning of the scaffolding metaphor is too bound to the special case of middle class industrialized societies, and, more broadly, that analyses generated by the metaphor have focused largely at the "micro" level of adult–child interactions, paying little if any attention to the social or cultural factors influencing the quality and potential utility of that interaction (Griffin & Cole, 1984; Rogoff, 1990; Tharp & Gallimore, 1988).

One early concern raised about the original conception of scaffolding related to its seemingly exclusive focus on adults as the agents for instilling new skills and understanding. This concern has been voiced by a number of people, most notably Rogoff (1990) and Forman (e.g., Forman & Kraker, 1985), both of whom have produced careful conceptual and empirical analyses of the potential role of peers in the scaffolding process. Although Rogoff's research pointed to some interesting shortcomings in the sensitivity and effectiveness of the scaffolding behaviors of children compared to those of adults (see Rogoff, 1990, for a summary of this work), she acknowledged nonetheless that peers can be valuable sources of new learning, and that adults play a much less important role than peers in everyday learning opportunities in some societies.

A second criticism voiced about the scaffolding metaphor is that it has led to a conception of adult–child interactions as too other-driven or one-sided in nature. Searle (1984) expressed the concern that too literal an adherence to a scaffolding metaphor, especially in the hands of insensitive teachers, could result in "the imposition of a structure on the student" (p. 481). A slightly different concern was raised by Rogoff, Malkin, and Gilbride (1984), who emphasized the role that children

play in arranging for the kinds of support they need:

> At all ages . . . children play an active role in their own development, putting themselves in a position to observe what is going on, involving themselves in the ongoing activity, influencing the activities in which they participate, and demanding some involvement with the adults who are their guides for socialization into the culture they are learning. (pp. 43–44)

A related point made by Rogoff (1990; Rogoff et al., 1984) was that analyses of the scaffolding metaphor put too little emphasis on the ways in which the dynamics of scaffolding changed as a function of the developmental status of the child. For example, in the study by Rogoff et al. (1984), the major focus of parental scaffolding in the context of a jack-in-the-box activity "shifted from attempting to maintain joint attention" (p. 43) for infants of 4 months of age to "managing joint use of the jack-in-the-box" (p. 43) for infants between 5 and 12 months of age to "managing the social relationship in the joint activity through persistent symbolic communication" at 12 to 17 months (p. 43). For a related discussion of age-related changes in children's ability to benefit from scaffolding, see Wood, Wood, Ainsworth, and O'Malley (1995).

A third concern voiced about the scaffolding metaphor is that it assumes an idealized adult–child relationship. Some authors, such as Litowitz (1993) and Goodnow (1990), for example, have emphasized that the adult–child interactions that take place during scaffolding are not as affect-neutral as they are assumed to be. Litowitz emphasized the conflicts inherent in role relations in certain parent–child interactions; Goodnow pointed out that potentially negative values are sometimes attached to objects or skills to be mastered. Dyson (1990) emphasized the potential problems for the scaffolding metaphor created by the existence of cultural differences in the classroom in the meanings of various actions and objects.

The related point has been made by several authors that occasions for scaffolding in the day-to-day interactions in homes, communities, or schools may not be as frequent as is sometimes assumed, or that adults may fail to take advantage of such occasions. Gelman and Massey (1987) reported, for example, that middle class parents who were observed interacting with their children at a mathematics exhibit in a young children's science museum rarely engaged in any sustained interactions related to the focus of the exhibit. In a potentially encouraging counterexample, Brown, Campione, Reeve, Ferrara, and Palincsar (1991) reported evidence that mothers who were classified as scaffolders on the basis of their pattern of parent–child interactions in a laboratory-based addition problem involving manipulation of candies exhibited very similar interactive styles in a second session 1 week later, suggesting some stability in scaffolding style. However, the fact that the children of scaffolding mothers performed no better than the other children on a pretest measure of addition skills led the authors to speculate that the scaffolding behaviors they observed were elicited by the demand characteristics of the laboratory setting and might actually be rare in day-to-day life. (In fairness, it should be noted that the children of scaffolding mothers did perform significantly better on a posttest measure, suggesting that the scaffolding interactive style, regardless of its impetus or frequency in the real world, led to better learning.) Finally, Fleer (1992), in her comparison of the findings of three case studies of science classrooms, emphasized that there are considerable individual differences in natural teaching styles—one of the three teachers she observed exhibited seemingly ideal scaffolding of students' learning while the two others merely told children what to do.

A fourth concern raised by critics of the scaffolding metaphor is that the metaphor itself encourages us to focus on quantitative rather than qualitative changes in children's knowledge. In essence, the image created is one of accretion rather than of reorganizing skills or understanding. This point was emphasized by Cazden (1988) and Wertsch (1991), both of whom viewed reconceptualization as a central issue in new learning. Cazden also quoted Engestrom, who said, "The idea of scaffolding is restricted to the acquisition of the given" (Engestrom, as cited in Cazden, 1988, p. 108). This point is related to the following point, and it will be taken up in later discussion.

A fifth and final concern from existing discussions of scaffolding that I would like to stress is the argument that the mechanisms by which new learning takes place during such adult–child interactions need greater specification. As mentioned earlier, in their original discussion of scaffolding, Wood et al. (1976) provided a sketch of such a mechanism. They describe the adult's role in directing the child's attention, demonstrating solutions, and taking control of some aspects of the task so that the child could concentrate on others. They also hinted at a process by which the child moves from comprehending to producing a task solution. However, as several authors have pointed out, the actual details of such a process have not been clarified in subsequent discussions. More important, perhaps, are concerns that the discussions of possible mechanisms have underemphasized potentially key components (Palincsar, 1986; Stone, 1993; Tharp & Gallimore, 1988; Wertsch, 1985).

Taken together, the various concerns discussed above should certainly lead one to question any unqualified application of the scaffolding metaphor to the analysis of children's learning and development. Indeed, use of the metaphor in the fields of developmental and educational psychology is increasingly more cautious and analytic (see, e.g., Meyer, 1993). I certainly agree with such caution. In addition, as I hope to make clear later, I have even more concerns when the meta-

phor is applied to the case of exceptional learners. However, I am not yet ready to advocate abandonment of the metaphor.

The Appeal and Limits of the Metaphor: Can/Should It Be Salvaged?

Gradually, in reaction to various of the concerns summarized above, some scholars have begun to suggest conceptual alternatives to the scaffolding metaphor. Still others have begun to avoid the metaphor altogether, opting instead to frame discussions of children's learning in the context of Vygotsky's notion of the zone of proximal development. This strategy seems to imply that nothing is gained by working with any metaphor, or at least with the metaphor of scaffolding.

Of the explicit alternatives that have been offered, two proposals have gained considerable prominence. One comes to us from the field of educational psychology (Tharp & Gallimore, 1988), and the other (Rogoff, 1990) from the field of developmental psychology, although both are the product of rich interdisciplinary scholarship. Each of these alternatives has considerable virtue and has proven conceptually fruitful. I will discuss each in turn. A third alternative perspective, termed *legitimate peripheral participation*, has also received a good deal of recent interest among developmental psychologists (e.g., Lave, 1991). This approach is based more squarely in a cultural–anthropological perspective and to date has had only minimal impact among those concerned with educational issues; thus, I will not discuss it here. For an example of its application to instructional issues, however, see Forman (in press).

In their alternative to the scaffolding metaphor, Tharp and Gallimore (1988) proposed that we conceptualize teaching as a process of "assisted performance" (p. 21), in which children are engaged by their teachers in "responsive, assisting interactions" (p. 21). They further posited that such assistance should be provided in "activity settings" (p. 72) in which children are engaged by responsible adults in the co-accomplishment of meaningful goals. Tharp and Gallimore's intent in dropping the scaffolding metaphor was to avoid what they saw as its implication that adult assistance is merely a matter of providing more or less of the same type of assistance: "For example, scaffolding suggests that the principle variation in adult actions are matters of quantity—how high the scaffold stands, how many levels it supports, how long it is kept in place" (p. 34). With their image of "assisted performance," they hoped to emphasize that adults have access to a range of types of assistance, and that the assistance is embedded in ongoing performance of a task.

A second alternative to the scaffolding metaphor was Rogoff's (1990) metaphor of "apprenticeship." In offering this metaphor, Rogoff hoped to emphasize the contextually embedded nature of children's learning. She also hoped to connect our thinking about the adult assistance of children's learning in Western industrial societies with our understanding of apprenticeship customs in other societies. Rogoff (1990, 1993) suggested that successful apprenticeships involve the complementary processes of *guided participation* and *participatory appropriation*, which entail, respectively, adult assistance in children's learning and children's active effort at transforming their understandings. In discussing both notions, Rogoff (1993) emphasized the term *participation*, which she believed highlighted the fact that both parties were participating in a joint cultural activity rather than merely observing or reacting to each other.

Given the various criticisms of it, and the potentially useful alternatives available, should we abandon the metaphor of scaffolding? Certainly, it would be hard to argue that doing so would be categorically unwise, and I find myself reluctant to argue strongly against such a tactic, and yet I also see some virtue in keeping the metaphor and working to clarify and enrich it. One reason is that the metaphor has a rich history. This is, of course, both a blessing and a curse if one is intent on modifying it. However, use of the term does connect discussions to a now long history of efforts to understand how adults aid in children's learning and development.

A second reason for trying to salvage the scaffolding metaphor is that, unlike some rich metaphors in the field of psychology, such as the computer metaphor in the area of information processing, the scaffolding metaphor does not impose many constraints on how one thinks about the phenomenon of interest (in this case, children's interactions with those in their environment), and thus it does not, in and of itself, lead to a conceptual distortion of such interactions. Thus, it can be elaborated without violating its central insight. There is, of course, an irony here: The extent to which the metaphor allows for unconstrained elaboration is also an indication of the limits of its heuristic value as a source of new conceptual understandings. Part of the power of a metaphor derives from the richness of the image it evokes and from the analogy between elements of that image and the as-yet-undiscovered or poorly conceptualized elements of the novel domain to be explored. To the extent that a metaphor fails to constrain our thinking about that novel domain, it loses some of its inherent power.

A third and final reason for keeping the scaffolding metaphor is that it does, indeed, highlight one of the key features of children's learning, namely, that it is often guided by others, who strive (explicitly or implicitly) to structure learning opportunities. In addition, the metaphor captures the common observation that such guidance is usually temporary and is "dismantled" as children demonstrate increasingly sophisticated activity.

In arguing for preservation of the scaffolding metaphor, however, I do not mean to argue that it does not need refinement. The metaphor is rela-

tively mute, for example, concerning how such structuring results in new learning. I will return to this issue in the following section. In addition, I do not mean to argue *against* the value of alternatives (e.g., Rogoff's notion of apprenticeship). There is much of value in other metaphors, and there is much to be gained from a pluralistic conceptual enterprise.

Enriching the Scaffolding Metaphor

If we are to keep the metaphor, I would argue that it needs considerable refinement. In particular, it needs to be invigorated with a much more explicit theory of the mechanisms involved in the instilling of new understandings. Providing such a theory is crucial for our general appreciation of why scaffolded interactions are effective. However, it is even more essential in our consideration of how such a model of learning and instruction can apply in the case of atypical children. Because we do not understand the dynamics involved in scaffolded interactions, we cannot predict who will and will not benefit from particular types of scaffolding. Thus, in the present section, I hope to sketch some key elements of an enriched conception of scaffolded instruction. With some idea of these mechanisms in hand, we can then turn to a consideration of the implications of the scaffolding metaphor for the case of atypical children.

The Interpersonal Context of Effective Scaffolding of Children's Learning

The key notion captured by most discussions of the scaffolding metaphor is that of a joint but necessarily unequal engagement in a valued activity, with a gradual shift in responsibility for the activity. Central to this image are the notions of affective engagement, intersubjectivity or shared understandings, graduated assistance, and transfer of responsibility. With some variation in emphasis and terminology, the centrality of these notions is widely accepted. I would add to this account, however (as would others), the notions of communicational challenge and inference, and knowledge consolidation. The need for this expanded image of the scaffolding metaphor is the topic of the following paragraphs.

From its inception, the scaffolding metaphor was intended to refer to a situation in which a more capable other (usually an adult) helps a child to accomplish a task in which the child shares at least an interest, if not a similar goal orientation. The issue of the extent to which the goal of the task is shared is a complex one. Wood et al. (1976), in their original treatment of the metaphor, seemed to assume that the goal (in their case, the construction of a wooden puzzle tower) was completely shared by the adult and the child. This may indeed have been the case in their own research, as a model of the completed puzzle was available and the tower had a perceptually symmetrical and culturally stereotypic shape. However, in other examples in the scaffolding literature (e.g., Greenfield's [1984] toy telephone example discussed earlier) it is not as clear that the adult and child share the same goal from the outset. Indeed, one could argue that helping a child to appreciate an adult's goal for a particular activity is the major purpose of the scaffolding (Wertsch, 1979, 1991). Regardless of one's stance on this issue (and I suspect that it varies with the task or activity involved), it seems evident that the activity must be one that is close enough to the child's understanding to capture his or her interest, and that there must be some initial shared understanding about the task setting, however limited it may be relative to the final task perspective to be achieved. That is, an initial (and ongoing) joint task engagement is essential, even if the task means different things to the two (or more) participants. This partial sharing of perspectives is often referred to as *intersubjectivity* (e.g., Rogoff, 1990; Rommetveit, 1979; Wertsch, 1985).

An additional feature of the scaffolding metaphor is graduated assistance. This feature is linked, of course, to the image of adding or removing layers of scaffolding around a building or statue. Here, the dangers of too literal a use of the metaphoric image are evident. Layers of scaffolding are fairly uniform in construction and function. In contrast, the notion of graduated assistance usually includes the idea that there will be qualitatively different types of assistance, even if one can array them on some rough conceptual hierarchy of increasing or decreasing "directiveness." In addition, the dynamic character of adult titration of assistance in accordance with the child's seeming task mastery is not well captured by the metaphor. The importance of such titration was underscored by Wood and colleagues in their original writings (Wood et al., 1976; Wood et al., 1978), and others have continued to use the notion of graduated assistance in their attempts to operationalize the construct of scaffolding (e.g., Day & Cordon, 1993; Pacifici & Bearison, 1991).

The final feature of the core meaning of the scaffolding metaphor is transfer of responsibility. This is, of course, a key notion, because the whole purpose of constructional scaffolding is to allow the building to eventually stand on its own. Although this notion of transfer is involved in every discussion of the scaffolding of children's learning, there is considerable variation in discussions of how the transfer of responsibility is accomplished. In my mind, this is a key issue. An understanding of the mechanisms of transfer is essential, for two reasons. First, it may allow us to engineer more effective scaffolding, and second, it would allow us to recognize the ways in which various individual child characteristics present challenges to successful scaffolding (Stone & Reid, 1994).

In their original discussion, Wood et al. (1976) addressed the transfer is-

sue in terms of the distinction between *comprehension* and *production*: During the process of scaffolding, the child comes to produce a series of actions, the execution and/or result of which she or he could already comprehend. This image undoubtedly owes a good deal to Bruner's (1975) then-current work on adult fostering of child language development (Bruner, 1975), a context in which the image seems to work rather well. It is less clear how the notion works in the context of a complex activity, the exact details of which, and maybe even the eventual goal of which, the child is largely ignorant of. Palincsar and Brown's (1984) work on reciprocal teaching comes to mind here.

Despite a perhaps unfortunately narrow emphasis on the mastery of concrete goals, there is a good deal of insight in the original notion of Wood et al. (1976). In a scaffolding situation, the child is led to participate in an activity whose full meaning has yet to be fulfilled. That is, the child is acting in anticipation of full understanding and must develop an understanding from the actions in which he or she is led to engage. In some earlier discussions, Jim Wertsch and I referred to this type of interactional dynamic as "proleptic" (p. 197). *Prolepsis* is a Greek rhetorical term for the mention of a referent in a conversation prior to its actual introduction into the conversation. Such foreshadowing provides a strong challenge to the listeners to infer the referent for themselves from the present or ensuing comments (Stone & Wertsch, 1984).

Prolepsis is a special case of a broader phenomenon that can be understood as a cycle of communicational challenge and inference (Stone, 1993; Wertsch, 1985; Wertsch & Stone, 1985). When we hear an utterance or observe an action that seems to have an intentional character, we strive to impose meaning on it. If the immediately preceding utterances or actions provide sufficient ground for such an inference, we automatically construct an understanding of the utterance or action. If there is insufficient ground for such an inference, a certain degree of cognitive tension is created. Rhetoricians often take advantage of such tension to engage their audience (Rommetveit, 1979). In a similar, if unintentional, way, adults do this with children: New words are uttered, novel actions are modeled, and only subsequently is the child given sufficient additional information to allow an inference of what was originally intended. Such inferences lead to an understanding of the novel word or action—an understanding which may be all the richer by virtue of the highly motivating communicational tension that preceded it.

This image of scaffolding exchanges as involving cycles of communicational challenge and inference provides a way to appreciate how the transfer of task understanding is accomplished. As children strive to infer the meaning of an adult's actions or utterances, they construct an understanding of what the task is all about and how to execute it on their own. The active engagement involved also helps to sustain the child's initial interest in the task. (Note that without some initial interest, the interaction would not go forward.)

But what exactly is involved in communicational challenge and inference? Here we get to the heart of the matter, especially if we hope to appreciate how all of this relates to the special case of atypical children. Unfortunately, we also are at a level at which much work needs to be done. What is needed, of course, is a model of communication and inference. I cannot pretend to provide such a model; however, I can point to what I see as some essential ingredients.

First, it is important to note that I am using the term *communication* to encompass both verbal and nonverbal communication. In fact, I feel that separating the two is a very unwise strategy because they are complexly intertwined in actual interactions. Thus, any analysis of the communicational dynamics must consider both verbal and nonverbal symbol systems, as well as the perceptual systems that support them.

Second, it is important to conceptualize inference as a cognitive act, one that draws on—and is limited by—background knowledge and various mental resources, both cognitive and linguistic. Furthermore, inference is a multilayered cognitive act, subsuming automatic and unconscious processes as well as intentional, conscious processes.

Finally, I share with many constructivist-oriented psychologists, including those influenced by both Piaget and Vygotsky, the view that knowledge construction is an ongoing process of integration and consolidation. One possible implication of this premise is that the final effects of a scaffolding interaction may not be evident for some time after the interaction (Stone & Reid, 1994).

The paragraphs above provide only a few elements of a model of the dynamics involved in an instance of scaffolding. However, I hope they serve to emphasize that it is not only the adult who is working hard during such exchanges. Furthermore, it is important to recognize that an analysis of scaffolded instruction would not be complete without some consideration of whether the child involved has the linguistic, cognitive, and social skills necessary to engage in and profit from the interaction. Finally, it becomes important to consider whether the child is sufficiently engaged by the situation *and* by his or her relationship to the "scaffolder" to be motivated to participate in the communication games involved in successful scaffolding. I will return to these issues later.

The Sociocultural Context of Effective Scaffolding

The preceding discussion of the dynamics involved in scaffolding would probably make some current developmental and educational psychologists very uneasy because it

seems to imply that scaffolding takes place in a cultural vacuum. This is certainly not the case; as many have argued in recent years, children's learning must be considered in terms of cultural and institutional dynamics as well as interpersonal dynamics (Forman, Stone, & Minick, 1993). The above discussion emphasizes interpersonal dynamics, but it is important to acknowledge that interpersonal dynamics are part and parcel of their institutional and cultural contexts. Indeed, it should be acknowledged that one and the same act of interpersonal communication may be differentially effective, or even have different meanings—both cognitive and affective—in different institutional or cultural contexts (Stone, 1993).

Tharp and Gallimore's (1988) notion of "activity setting" (p. 72) is very useful in helping to contextualize the notion of scaffolding. In their terms, an activity setting captures the who, what, where, when, and why of an event. It is, in essence, the smallest unit into which "context" can be divided without losing some of its essential character.

What is crucial for present purposes is to appreciate the ways in which the activity context that frames a scaffolding interchange influences the nature and flow of that interchange. It does so in two ways. First, it influences the extent of affective engagement in the task and in the interpersonal exchange between the child and the adult. Second, it colors the participants' interpretations of any communicational moves and thus sets constraints on possible communicative inferences. In these ways, the activity setting is an inherent componént of a scaffolding exchange.

An Enriched Metaphor of Scaffolding

If we add the notions sketched above to our earlier understanding of the scaffolding metaphor, what do we have? We still have the notion of an adult (or knowledgeable peer) engaged with a child in an activity, the goal and procedures of which are not fully within the comprehension and/or capabilities of the child. The adult provides ongoing assistance as necessary to support the child's engagement in the task, but she or he also works naturally to reduce that support, so that eventually the child is performing independently. The process by which this transfer of understanding and responsibility is accomplished involves a continuing cycle of communicational tension and resolution. During these cycles the child is engaged in an ongoing process of communicational inference as a means of making sense of the adult's actions or utterances, drawing on both preceding and subsequent actions or utterances to clarify or reconceptualize unfamiliar actions. In this way, the child comes to share more fully the adult's perspective on the activity at hand and is thus more capable of acting in light of a new task definition.

So, one might ask, what is left of the original scaffolding metaphor? Are we still using the metaphor in any meaningful sense? We have certainly moved beyond any literal interpretations of a construction scaffold, with its connotations (for many) of a passive, incremental layering of subcomponents. We have abandoned the much simpler, incremental view of adults as gradually providing next logical pieces of information in an ongoing accretion of skills. We have also abandoned a view of the adult as molder of passive child. Instead, we have an image of scaffolding as a complex social process of communicational exchange and conceptual reorganization through which knowledgeable others foster new understandings and capabilities.

In making these changes to our notion of the scaffolding process, we have perhaps moved beyond the strict confines of the original metaphor. However, the added features, though not strictly dictated by the image of a scaffold or of the activities that take place on and around a scaffold, nonetheless do not violate that image. I would argue that the elaborations of the metaphor as sketched here can serve as a useful heuristic to guide our thinking about children's learning and instruction. The true test of a metaphor's utility, however, is in an analysis of what it can do for us. Armed with a richer notion of how we should conceptualize the scaffolding process, I undertake in the following section an analysis of the metaphor's utility for the field of learning disabilities. In doing so, I will look at both existing applications of the metaphor and directions for future applications.

Applications of the Scaffolding Metaphor in the Learning Disabilities Field

As in the case of developmental and educational psychology more broadly, the notion of scaffolding has received a good deal of attention and use by those interested in the development and education of children with learning disabilities. In the following paragraphs, I will review and evaluate some of the past work, and I will suggest means of gaining more mileage from the metaphor in the future.

Existing Applications of the Scaffolding Metaphor to Atypical Children

In the present section, I will provide a brief overview of past efforts to apply the scaffolding metaphor to the special case of atypical children, with particular attention to children with learning disabilities. As was the case in the earlier discussion of the research involved in the evolution of the scaffolding metaphor, my intent here is not to be exhaustive. Rather, I hope to provide a feel for the issues that have been raised and of the benefits reaped from applications of the metaphor to atypical children. I also hope to highlight, in the context of the preceding discussion of an expanded understanding of the mechanisms of scaffolding, certain unfulfilled prom-

ises. My intention here is not to be critical; rather, it is to raise issues, open possibilities, and begin a dialogue.

As was the case in the earlier overview of scaffolding research, it is useful to organize the discussion in terms of two groups of studies—those focused on parent–child interaction and those focused on teacher–student interaction. As one might suspect, given the focus of the field of special education, the latter group of studies is much larger than the former, and therefore will receive more attention.

Parent–Child Interaction. The majority of the work focused on the interactions of parents and their children with disabilities has made little use of the scaffolding metaphor. Instead, various related constructs, such as the zone of proximal development, have been used as organizing schemes, and the scaffolding metaphor has played lesser role in the discussion. Thus, I include here only a small subset of a much larger literature on parent–child interactions. Some brief discussion of the work is worthwhile, however, as a means of highlighting unexplored issues. For additional discussions of this research, see also Forman and McCormick (1995) and Stone and Conca (1993).

One of the earliest and most elaborate studies of parental scaffolding with atypical children was conducted by Irving Sigel and colleagues at the Educational Testing Service in the early 1980s (Sigel, McGillicuddy-DeLisi, Flaugher, & Rock, 1983). Components of that project were reported in various sources, but the most relevant discussion for our purposes is that of Pellegrini, McGillicuddy-DeLisi, Sigel, and Brody (1986). Pellegrini et al. reported the results of a comparison between the interactive styles of the parents of a group of 60 preschool children with communication handicaps (ages 3-6 to 5-8) and those of the parents of a group of 60 children with normal language development. The children with communication problems had normal hearing and a diagnosis of phonological production problems and/or language production delays. The children in the two groups were matched in a pairwise fashion on a number of variables, including age, gender, ordinal position in the family, and parental education. The parents (both mothers and fathers in a counterbalanced design) were asked to help their child complete two tasks, a book-reading task and an origami (paper-folding) task.

The analyses were focused on the level of the child's engagement in the task and the level of support and the cognitive demands implicit in the parent's interactive moves (verbal or nonverbal). The results indicated that the children in the two groups were equally engaged in the tasks; however, significant differences existed between the two groups in terms of parental behaviors. In general, parents of the normally developing children provided assistance that was judged to be less supportive and more cognitively demanding; however, this difference was more evident on the reading task than on the origami task. Pellegrini et al. (1986) interpreted these findings as indicating that parents were sensitive to their child's needs and adjusted their level of support as a function of both task demand and communication status.

The study reported by Pellegrini et al. (1986) had a number of significant assets. It was based on large and carefully matched samples (although it should be noted that IQ level intentionally was not controlled). It provided a basis for comparison of parental behaviors across two different tasks, one of which was presumably much more closely linked to the area of difficulty of the children with handicaps. However, from the perspective of our earlier discussion of scaffolding, there were also some significant shortcomings. Most important, as the authors themselves pointed out, there were no direct analyses of the moment-to-moment contingent relationship between child behavior and parent support. Furthermore, there was no report of what the children may have learned from the interactions about the goals or procedures involved in the tasks. This information is crucial for a proper evaluation of the extent of scaffolding provided by parents.

A second study of parental scaffolding, dating from approximately the same time, is Wertsch and Sammarco's (1985). In that study, the mothers of six 3-year-old boys with significant receptive language disorders were observed as they helped their child to arrange a toy airport scene so that it matched a prearranged model provided to the mother. A comparison group of 6 normally developing boys and their mothers also participated. The two groups of boys were matched for age, nonverbal intelligence, and sensory acuity. Wertsch and Sammarco's analyses focused on who took responsibility for the placement of each toy in the scene (mother or son). They also coded the level of assistance provided by the mother for each toy placement the child carried out. The results indicated that the mothers of the children with language disorders took more direct responsibility for task assembly than the mothers of the normally developing children. Of most relevance to the discussion of scaffolding, the former mothers also engaged in briefer chains of titrated assistance before "giving up" and placing the toy themselves. Wertsch and Sammarco argued on the basis of their findings that the mothers of the boys with language disorders, by aborting the cycle of assistance, were providing less effective contingent instruction for their sons. Unfortunately, the authors did not include any assessment of what the boys in each group learned about the task; in addition, in the context of the earlier discussion of the dynamics of scaffolding, it is worth noting that they did not include any analysis of the communicational demands of the maternal directives beyond a binary coding of direct versus indirect assistance.

Although the Wertsch and Sammarco (1985) study was based on a single task and used a very small sample of children, it provided a nice example of one way to conduct analyses of the contingent nature of parental scaffolding. Coupling analyses such as these with assessments of task-relevant knowledge before and after the interactive session would provide an interesting window into the effectiveness of parental scaffolding of atypical children.

A final study of parental scaffolding of the performance of atypical children is that of Levine (1993). Levine provided an analysis of the interactions of the mothers of 30 developmentally delayed preschool children (ages 31 months to 44 months) as they attempted to put eight shoes away in pairs. The task took place in the child's home, and the mother was instructed to use any assistance deemed appropriate. Levine's informal analysis of the transcripts emphasized the wide variation among mothers in the types of assistance provided to their children. Levine pointed out, however, that the mothers did not seem to take sufficient advantage of opportunities to help the children link the current task to other experiences, or to appreciate the larger goal (sorting shoes into pairs) that organized specific substeps (finding one shoe that looked like another). In the most interesting analysis for our purposes, Levine created a hierarchy of maternal utterances that moved from less to more explicit guidance in the context of the task goal. Levine then tallied the number of occasions on which the mother moved from a more directive to a less directive utterance in response to child success, or from a less directive to a more directive utterance in response to failure. Such analyses are similar to those used by Wood et al. (1978) and Day and Cordon (1993) and are clearly consistent with the scaffolding metaphor. Levine noted that "scaffolding-consistent" moves were more than twice as frequent in the transcripts as were "scaffolding-inconsistent" moves.

Levine' (1993) study is interesting for several reasons. First, he used an everyday task in a home setting—a task that has a good deal of face validity. It should be noted that he introduced the task only after spending a minimum of 6 hours observing in the home. Such a strategy would minimize concerns regarding the naturalness of the interactions observed. Second, Levine's coding system emphasized the contextual appropriateness and contingent nature of the maternal interactions. Third, Levine provided rich examples of the broad range of maternal and child behaviors observed, thus discouraging any simplistic, unidimensional analysis of maternal scaffolding behavior. Unfortunately, Levine did not report any comparable data from a group of normally developing children and their mothers. Thus, it is very difficult to evaluate his conclusion that the mothers of children with developmental delays were providing inappropriate scaffolding of their children's learning.

This brief review of past efforts to apply the scaffolding metaphor to the analysis of parental assistance of atypical children's learning should serve to highlight two points: (a) The approach promises to provide a rich and contextually sensitive analysis of parent–child interaction, but (b) much work needs to be done before we can evaluate the payoff of this approach. In extending this line of work, three issues are highlighted by the positive features of the studies reviewed. First, analyses of the contingent relation between child behavior and parental scaffolding moves are essential. Second, we should bear in mind that such contingencies are likely to play themselves out in a variety of interactional moves, and thus unidimensional coding systems are likely to miss potentially important dynamics. Third, we must be sensitive to the relation between the task context observed and the child's current skill level and everyday experiences.

In addition, it is important to note that none of these studies took full advantage of the potential inherent in an enriched understanding of the scaffolding metaphor. In particular, it is possible that an approach to analysis that is more sensitive to the communicational and cognitive demands of the scaffolding interactions would lead to a better appreciation of how the interaction is structured and of its appropriateness for the child. In all three studies discussed here, some attention was paid at a general level to the nature of the children's cognitive or linguistic limitations; however, little effort was made to understand how those limitations related to the ongoing interaction between the parents and the children. Such analyses would not be easy, but they are essential if we are to understand why parents interact with their children with handicaps as they do, and what the benefits or dangers of such interactions are. I will discuss this issue in more detail later.

Teacher–Student Interaction. In contrast to the remarkably limited application of the scaffolding metaphor to the study of parent–child interaction in atypical cases, there is a fairly large literature devoted to applications of the metaphor to the development of more effective teacher–student interactions during instructional sessions. This work varies from studies that make extensive use of the metaphor for designing instructional "metascripts" and/or guiding interpretations, to studies that make rather limited use of the metaphor as a way of characterizing interactions designed or characterized primarily from a different perspective. I do not intend to provide an exhaustive review of this work here. Instead, I will provide selected examples of the various uses to which the metaphor has been put.

Instructional research focused on problem learners and explicitly designed in light of the scaffolding metaphor has a relatively recent history, but the number of such studies is expanding rapidly. Probably the earliest such study was Palincsar and

Brown 's (1984), which was mentioned earlier. Although Palincsar and Brown noted that the remedial reading students included in their studies of reciprocal teaching had not been officially categorized as learning disabled, the characteristics of the students suggest that at least some of them may have had a specific reading disability in the area of comprehension. Regardless of the exact nature of their participants' reading problems, however, Palincsar and Brown provided in their early research a useful operationalization of the notion of scaffolded instruction—one that has had an important impact in the field of special education.

Palincsar and Brown's (1984) reciprocal teaching work is well exemplified in one of their initial studies (Study 2). In that study, four groups of junior high students ranging in size from four to seven students participated in approximately 20 reciprocal teaching sessions, each led by their general education reading teacher in the classroom or resource room and lasting approximately 30 minutes. The students were not labeled as learning disabled by their schools, but they were all in the lowest reading groups and all had poor reading comprehension despite adequate decoding skills, as judged by their teachers and as demonstrated on pretest measures.

The reciprocal teaching procedure consisted of asking students (and the adult instructor) to take turns serving as the "teacher" in leading the group's effort to understand a paragraph of the target text. The texts were all grade-appropriate expository passages covering the social and natural sciences. Following the group's silent reading of a paragraph from the text of the day, the teacher for that paragraph was expected to engage in a routine sequence of activities: ask a question about the paragraph, summarize the paragraph, and, finally, offer a prediction or ask for clarification, as necessary. The adult instructor (the reading group's actual teacher) assisted the "teacher" of the moment, as necessary, in executing the sequence of activities through a range of means, including modeling, prompting, and direct explanation. These procedures were repeated in each of the 20 sessions. Students were given an explicit orientation to the purpose of the activity and then were given regular feedback on their progress in the form of graphs of their performance. Student progress was assessed by asking each student at the end of each session to answer a set of comprehension questions based on a brief passage adapted from the same expository materials.

The success of the intervention was assessed via the graphs of improvement (comparing baseline and maintenance sessions to intervention sessions) and statistical analyses of comprehension performance in blocks of sessions, before, during, and after the intervention. In general, the students' comprehension performance improved from 40% correct to 70% or 80% correct. The improvements were statistically reliable and were maintained across a follow-up retest interval of 8 weeks. Direct measures of use of the target reading strategies (e.g., summarizing, predicting) also resulted in significant improvements as a result of the intervention.

In addition to the data on student progress in reading comprehension, Palincsar and Brown (1984) provided both qualitative and quantitative analyses of changes in the nature of the instructional interactions across sessions. These analyses indicated that the assistance provided by the adult instructors was generally sensitive to the students' needs at the moment, and that the amount and directiveness of the assistance decreased across sessions. Parallel to this shift were significant increases in the frequency with which the students provided clear questions and summaries.

The Palincsar and Brown (1984) study exhibits several key features of an enriched notion of scaffolding such as that sketched above: the encouragement of the student's active engagement in an ongoing, meaningful activity, the provision of assistance that was contingent on the student's current level of understanding, the gradual withdrawal of support with accompanying encouragement for independent performance, and the use of teacher–student dialogue rather than didactic training as the vehicle for strategy instruction.

One limitation of the original study was its failure to disentangle the exact source of the benefits produced by what was a complex mixture of new strategies and new instructional dynamics. In subsequent work, however, the authors produced evidence of the particular importance of the scaffolded nature of the instructional interactions above and beyond the role of the specific reading strategies embodied in the instruction (Brown & Palincsar, 1987; Palincsar, 1986). Another limitation of the reciprocal teaching work is that the authors did not pay sufficient attention to the relation between individual child characteristics and differential benefit from the scaffolded instruction. In several sources (e.g., Palincsar, 1986; Palincsar & Brown, 1987), they provided rich illustrations of the teacher–student dialogues characteristic of children making varying degrees of progress during the sessions. However, these issues were not linked to information concerning the cognitive and language skills of the children involved. Such analyses are needed if we are to appreciate both the potential and the limitations of scaffolded instruction for atypical learners.

A second example of the use of the scaffolding metaphor in instructional research is a research program conducted by Bos and Anders (1990). Although that research originally was not motivated by the scaffolding metaphor, the authors have recently stressed the value of the metaphor in interpreting their findings. In a series of intervention studies, Bos and Anders evaluated a set of instructional approaches, collectively termed *interactive teaching*, that were designed to help students with learning disabili-

ties make strategic use of background knowledge in their comprehension of content area concepts. As in the reciprocal teaching approach, Bos and Anders trained teachers to engage in an ongoing dialogue with small groups of students. Teachers engaged the students in strategic questioning, organizing, and use of prior knowledge for the interpretation of science and social studies concepts. Students were encouraged to take an active role in the discussion and to make increasingly independent use of the organizing materials (e.g., semantic maps) and strategies (e.g., grouping together similar ideas) provided during the instruction.

In a series of four studies, upper elementary and/or middle school students with learning disabilities were assigned to one of two types of instructional conditions: an interactive teaching condition or a comparison condition, termed *definition instruction*, which was developed according to principles of direct instruction, including oral recitation, memorization, and teacher feedback. The comparison instructional condition was focused on the mastery of the same content area concepts targeted by the interactive teaching lessons. Across the four studies, students in the various interactive conditions learned more than the students in the comparison condition, as assessed via multiple-choice tests of knowledge of the content of the texts, or via written protocol procedures. In a recent summary discussion of these studies, Bos and Anders (1990) interpreted their findings as highlighting the importance of using conceptual frames for teaching content knowledge, and the importance of the scaffolding of instruction in effective teaching.

Like the work of Palincsar and Brown (1984), the studies by Bos and Anders (1990) provided some evidence that instructional dynamics consistent with the scaffolding metaphor can result in increased learning for at least some problem learners, compared to other, more traditional approaches. However, this work had some shortcomings, most notably that the link between child characteristics and instructional benefits was not explored.

A third and final example of instructional research explicitly informed by the scaffolding metaphor is the research program of Englert and colleagues. This research group has published a number of studies focused on improving the reading and writing skills of elementary and middle school students from both general and special education classrooms. I will concentrate on one recent study (Englert, Tarrant, Mariage, & Oxer, 1994) that provided a particularly nice example of how to apply the scaffolding metaphor to instructional research.

In their study, Englert et al. (1994) contrasted the efficacy of two approaches to teaching reading comprehension strategies to special education students in Grades 1 to 8. The students ($N = 109$), the majority of whom were classified as learning disabled, were seen in intact resource rooms. For purposes of examination of age differences in response to instruction, the students were divided into three grade groupings. A total of 35 instructors were involved in the intervention, all teacher trainees.

One of the instructional approaches, termed *POSSE* (for Predict, Organize, Search, Summarize, and Evaluate), was designed explicitly in terms of the scaffolding metaphor. There were two key features of the POSSE procedure: (a) the use of "graduated questions" (p. 168) intended to aid students in "building bridges between what [they] knew and what they still needed to know" (p. 168), and (b) the use of "procedural facilitation" (p. 168), which included the provision of physical cues to aid in strategy use (e.g., a cue card that prompted the use of specific strategies). The performance of children involved in the POSSE procedure was compared to that of children who were involved in another reading strategy condition, termed *K-W-L*, a more didactic instructional program centered on the use of worksheets to teach reading strategies very similar to those embodied in POSSE. The intervention for both conditions consisted of 24 thirty-minute sessions spaced over a 6-week period.

One particularly important feature of this study was the detailed discussion of the contrasting nature of the instructional sessions. That discussion included excerpts from lesson transcripts to illustrate the instructional dynamics. In general, the authors stressed the more didactic, confirmatory, and factually oriented nature of the K-W-L procedure versus the open-ended, collaborative, and integrative nature of the POSSE procedure.

The effectiveness of the two instructional approaches was assessed via recall measures of student comprehension of the passages used during instruction, and of novel passages. Students' declarative knowledge of the strategies embodied in the interventions was also assessed. The results indicated that students in the POSSE condition performed significantly better than their peers in the K-W-L condition on all three measures.

Another important feature of this work was a post hoc analysis, conducted by one of the authors (Mariage, 1995), of the instructional style of those teachers whose students showed the most progress. Mariage rank-ordered the teachers taking part in the study in terms of the gains evidenced by their students, and conducted an informal analysis of the lesson transcripts from the three highest-gain and the three lowest-gain teachers. Her analysis led her to conclude that the more effective teachers engaged in more modeling of the comprehension strategies, more scaffolding of students' performance via graduated questioning, and more recruitment of student participation in group discussions. Although it is impossible to disentangle the causal factors involved here, the results of Mariage's analysis are certainly consistent with the conclusions of Palincsar and Brown (1984) and of Bos and Anders (1990) that scaffolded instruction was a key de-

terminant of the instructional effects obtained.

In contrast to the researchers whose work is exemplified above, there is a second and much larger group of researchers who make some use of the scaffolding metaphor in framing their discussion of instructional issues but whose frameworks are less intimately linked to the metaphor. For these researchers, the term *scaffolding* serves primarily as a shorthand label for teacher structuring or temporary assistance. Rather than focusing on the dynamics of instruction per se, as in the preceding group of studies, studies in this second group place emphasis on preplanned activities or instructional materials. The quality of teacher–student interactions is presumably assumed to be important (hence the reference to scaffolding), but it is not seen as the key element in the instructional intervention.

One example of this approach is a study by Lenz, Bulgren, and Hudson (1990). In their paper, Lenz et al. presented a particularly thoughtful analysis of how to design an effective instructional approach to teaching content knowledge to students with learning disabilities. The approach was conceptualized as consisting of "teaching routines" and "teaching devices." The teaching routines, in turn, were divided into content orientation routines, understanding routines, and activation routines. It is in the context of the content orientation routines that Lenz et al. referred to scaffolding. The authors characterized scaffolding as the process of bringing the student to the edge of his or her current understanding in preparation for new learning. However, in their ensuing discussion of orientation routines as well as the other components of their instructional model, Lenz et al. placed their major emphasis on the use of "fixed" instructional devices, such as advanced organizers, content organizers, and lesson segmenting. Again, the dynamics of teacher–student interactions were alluded to throughout the discussion, but the emphasis was placed on what devices the teacher used, rather than on how she or he used them.

A second, fairly typical example of research that makes a more restricted use of the scaffolding metaphor is that of Graves and Montague (1991). In their article, the authors described a technique (developed in a series of carefully executed studies) for improving the narratives written by students with learning disabilities. The technique involved the use of external aids in the form of story grammar cue cards and checklists. The authors described this procedure as "an external aid to promote self-regulation" (p. 246) and characterized it as "a scaffold to facilitate completion of the task" (p. 246). Here, again, the scaffolding metaphor was used in the relatively restricted sense of temporary external tool or assistive routine. Relatively little emphasis was placed on the interpersonal dynamics involved, resulting in a fairly empty use of the metaphor.

As the above discussion hopefully makes clear, the scaffolding metaphor has had a wide range of applications to the instruction of children with learning problems. In actuality, these applications exist on a continuum, but for present rhetorical purposes, they can be seen as falling into two general groups. The first group of applications, such as those of Bos and Anders (1990), Englert et al. (1991, 1994), and Palincsar and Brown (1984), has imbued the metaphor with a fairly rich meaning, placing emphasis both on the image of temporary, graduated assistance and on the important role of adult–child dialogue. The second, much larger group of applications, such as those of Graves and Montague (1991), and of Lenz et al. (1990), has concentrated more exclusively on the first theme, that of teacher guidance and/or temporary assistance. Examples of uses of the scaffolding metaphor that fall more centrally on the continuum are those of Borkowski (1992), Ellis (1994), Norris and Damico (1990), and Rueda (1990).

In general, all of these applications are faithful to one aspect or another of the original scaffolding metaphor. However, the benefits derived from using the metaphor vary widely. In some cases, such as those of Englert (Englert et al., 1991, 1994) and Palincsar (1991; Palincsar & Brown, 1984), the metaphor has pointed the way to novel instructional approaches—approaches which, from existing evidence, seem to be fairly efficacious for at least some students with learning disabilities. In other cases, the metaphor has played a less central role in the instructional design, often merely pointing to the theme of adult structuring of children's learning. Overall, however, it seems to have been fruitful for those dedicated to helping children with learning disabilities.

Unconsidered Issues: Cognitive, Linguistic, and Interpersonal Demands of Effective Scaffolding

Although I have argued that there is merit in existing applications of the scaffolding metaphor to the special case of atypical learners, I have two reservations about the existing work. First, in the context of my earlier discussion of an enriched meaning for the metaphor, the majority of the existing studies fail to take full advantage of the metaphor's potential for guiding the analysis of instructional contingencies. Second, and perhaps more importantly, the existing discussions fail to acknowledge the cautions that are necessary in applying the metaphor to the special case of children with learning disabilities. These issues are explored in the current section.

With respect to the issue of missed opportunities, I would urge the reader to compare studies of parent–child interaction focused on normally developing children to those focused on children with learning disabilities. In the case of normally developing children, we see studies that either code for or manipulate interactional contingencies in order to explore the implications for children's learning. In the case of children with learning dis-

abilities, very few such studies are available, and those that *are* available are limited in terms of the range of tasks studied and the richness of the coding systems used. In essence, despite the well-developed methodologies for studying parent–child interaction sparked by the scaffolding metaphor, we have learned very little about how the parents of children with learning disabilities scaffold (or fail to scaffold) their child's performance in a range of everyday and academic activities. Such information is crucial if we are to appreciate the ways in which parents may contribute to their child's difficulties via missed opportunities for effective scaffolding of strategic activity (Stone & Conca, 1993). It is also important if we are to understand how parents could contribute in a positive manner to their child's development and learning.

In contrast to the relatively limited application of the scaffolding metaphor to the study of parent–child interactions, researchers and educators have taken more advantage of the scaffolding metaphor in designing instructional activities for students with learning disabilities. However, despite the rich use of the scaffolding metaphor in a handful of instructional studies involving children with learning disabilities, unanswered questions remain. It is here that my second concern about applying the scaffolding metaphor to children with learning disabilities arises. In essence, the issue relates to the seeming neglect of the cognitive, communicational, and interpersonal dynamics of effective scaffolding discussed above, and of the implications of these dynamics for children with language and learning disabilities.

I alluded to the cognitive and linguistic demands involved in scaffolding in an earlier section of this article (see also Stone, 1993; Stone & Reid, 1994), but I have not provided direct evidence of these complexities. Indeed, direct data are not yet plentiful. However, the complexities of the demands of classroom discourse patterns similar to those involved in scaffolded instruction are well documented (see, e.g., Green & Harker, 1988, and Forman & McCormick, 1995). In addition, the cognitive demands of communicational inferences such as those involved in scaffolding were emphasized by Sperber and Wilson (1982).

The population of children with learning disabilities is a heterogeneous one, and very little can be said about these children that has universal application. However, many of these children experience significant limitations in language comprehension, memory, attention, pragmatics, and/or self-reflection and self-control that might interfere with the cognitive and communicational demands of scaffolded instruction. The majority of the existing applications of the scaffolding metaphor to this population ignore these issues.

That individual differences in cognitive, linguistic, and interpersonal skills would play a role in the effectiveness of scaffolded instruction seems obvious. However, the issue is not a straightforward one. One could argue, for example, that precisely because of its focus on the titration of assistance, scaffolded instruction would be minimally susceptible to such individual differences. In the ideal case, of course, this would be true, and there are hints of such a phenomenon in the data of Day and Cordon (1993). However, the ideal case rarely exists— because those doing the scaffolding are rarely omnisciently aware of the communicational needs of the other, and because most educational applications of scaffolding are executed at the intact-classroom, or, at best, the small-group, level. Even at the small-group level, it is possible for variations in children's comprehension of linguistic frames, in their readiness for inferring meaning, or in their motivation for cognitive or interpersonal engagement to be overlooked—particularly if relevant theoretical discussions have not heightened one's awareness of the need to attend to such matters.

Possible Limitations of the Scaffolding Metaphor as an Instructional Model for Special Education

Implicit in my discussion of concerns regarding past applications of the scaffolding metaphor to the case of children with learning disabilities is the assumption that there is indeed merit in continued use of the metaphor, albeit with some important revisions. Not everyone would share that optimism. Indeed, several writers have pointed to potentially serious limitations in the utility of scaffolded instruction with children with learning disabilities. One frequently mentioned concern is that children with learning disabilities benefit most from a more direct approach to instruction. There are now many studies that provide testament to the benefits of highly structured instructional approaches for the teaching of certain skills. However, as many scholars have also pointed out, good instruction inevitably involves a mix of methods (Ellis, 1994; Tharp & Gallimore, 1988). In addition, a number of studies provide evidence that poor learners can indeed benefit from a more active, indirect instructional approach, especially for instilling conceptual understanding. Bos and Anders' (1990) findings regarding the relative effectiveness of direct versus interactive concept learning are one example; the study by Palincsar, Winn, David, Snyder, and Stevens (1993) is another. Thus, there is no reason to believe that all learning must take place via direct instruction.

A second concern that has been raised about scaffolded instruction is that it cannot be carried out effectively in large groups. There is some validity to this concern—especially in the case of atypical learners—and the point has been acknowledged by some advocates of scaffolded instruction (Palincsar & Brown, 1987). This is a serious concern if the LD field continues its unwise move away from specialized instructional activities for children with special needs.

A third cause for concern is a point made by many advocates of scaffolded instruction themselves. Scaffolded instruction is hard to carry off effectively, even for experienced teachers, and even highly motivated teachers have found the technique difficult to learn. This point has been made by Bos and Anders (1990), Englert et al. (1994), and Palincsar and Brown (1987), and I would not dispute it. I would hope, however, that this issue does not keep us from exploring the full potential of an instructional approach that has much to offer. Part of the problem here relates to current teacher training programs and to entrenched "ways of doing," which often resist even well-intentioned efforts at change (Reid, Kurkjian, & Carrathers, 1994; Tharp & Gallimore, 1988).

One final objection raised to the metaphor of scaffolded instruction is that it provides not one insight that is not already provided in existing conceptions of instruction. Ellis (1994), for example, pointed out that the emphasis on social mediation in discussions of scaffolded instruction is shared with earlier discussions of guided or prompted practice. Harris and Pressley (1991) noted that all good strategy instruction, regardless of explicit theoretical orientation, includes "dialogue, collaboration, and interactive learning" (p. 400). In response to these points, I would argue only that if we are to understand and improve our approaches to instruction, the key dynamics of an effective instructional approach must be explicit in our theorizing, rather than merely implicit in effective implementations, so that good practice can be promulgated more widely (Stone, 1989).

Where Do We Go From Here? Reaping the Benefits of an Enriched Scaffolding Metaphor for the Field of Learning Disabilities

Although I share some of the concerns raised by others about the utility of the scaffolding metaphor, I am hopeful that we have more to learn from careful applications of the metaphor to the special case of children with learning disabilities. As I have argued, however, I also believe that we need to refine our applications of the metaphor if we are to realize that potential.

Clearly, the success of initial efforts at scaffolded instruction suggests that one potentially fruitful application of the metaphor lies in the continued development of new instructional approaches. As we pursue this goal, however, it is important that we think more analytically about the approaches we develop. What are the effective components of successful scaffolded instruction? With what types of children does it work well? What types of skills, concepts, and/or procedures can be taught effectively via scaffolding? Where are the failures of scaffolded instruction (specific children, skills), and what can we learn about the limits of the approach from analyzing these failures? In pursuing these questions it is crucial that we work from, and continue to refine, a model of the teaching/learning mechanisms involved in scaffolding. As I have argued, communicational dynamics must be a key component of such a model.

In addition to the potential of the scaffolding metaphor for directing the development of instructional approaches, the metaphor may also prove useful in the area of prevention. Parents have in their day-to-day interactions with their children numerous opportunities to foster development of new concepts and strategies. The few studies of parental scaffolding discussed earlier suggest, however tentatively, that many such opportunities may be missed (see also Stone & Conca, 1993). There is potential here for the refinement of parent counseling techniques aimed at the early and continued development of compensatory strategies. We need to pursue this issue via systematic analysis of parent–child interactions. How common (across families, activities, child learning characteristics) are the types of maladaptive interactions highlighted in existing studies? How aware are parents of the interactional patterns they establish with their children? How readily can such patterns be changed? The analyses needed to answer such questions will have to move beyond counting types of parent questions and responses. Instead, we need analytic approaches that are more sensitive to the communicational contingencies involved in effective scaffolding.

In sum, my evaluation of the application of the scaffolding metaphor in the field of learning disabilities is a mixed one. There is much potential here, and applications of the metaphor have already proved useful. However, its potential has not been fully realized. If we are to make richer use of the metaphor, we must focus clearly on the communicational dynamics at the heart of successful scaffolding of children's learning. Effort invested in this direction may well contribute to our understanding of the causes and treatment of the learning inefficiencies and knowledge gaps characteristic of children with learning disabilities.

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