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Reciprocal Teaching procedures and principles: two teachers' developing understanding

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Abstract

The effectiveness of Reciprocal Teaching, a reading comprehension instructional technique, has been repeatedly demonstrated. According to Brown and Campione (Innovations in Learning, Erlbaum, Mahwah, NJ, pp. 289–325, 1996) “lethal mutations” are abundant because of teachers’ focus on how to do the procedures of Reciprocal Teaching and lack of understanding of the learning principles upon which the method is based. This investigation reports conceptual growth and the misinterpretations of the procedures and learning principles that two Schools for Thought teachers held as they developed their understanding across training sessions. We claim that studying the development of teacher thinking can be particularly useful to those revamping teacher education programs.

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Reciprocal Teaching is a researcher-developed instructional technique designed by Palincsar and Brown (1984) to promote reading comprehension abilities in students. The effectiveness of Reciprocal Teaching has been repeatedly demonstrated when the technique is correctly implemented under the close supervision of experts (Lysynchuk, Pressley, & Vye, 1990; Palincsar & Brown, 1984; Rosenshine & Meister, 1994). Without such monitoring, however, success is not always a given. Recently, Brown and Campione (1996) lamented that Reciprocal Teaching is often

implemented by teachers as a pre-set collection of procedures, without an understanding of why the techniques are effective. The authors discussed how teachers’ focus on procedures can lead to “lethal mutations” (Lamon et al., 1996) of the original Reciprocal Teaching method, which entails teachers having not developed accurate conceptions of the relevant learning principles or making conscious choices to adapt and change original instructional procedures (Barak Rosenshine, July 28, 1998, pers. comm.). Both are lethal in that they do not produce the reading comprehension gains that Palincsar and Brown (1984), and replications of their work (Lysynchuk et al., 1990), have shown are possible.

In the area of reading instruction, and specifically with respect to Reciprocal Teaching, more

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research is needed to understand the developing conceptions of teachers who are learning how to implement the technique. As evidenced by a growing body of literature (Calderhead, 1996; Carpenter, 1988; Shuell, 1996), incorporating teachers' prior and developing understandings into professional development endeavors is essential, mainly because one of the most important instigators of teachers' actions are the beliefs they hold about their discipline and student learning (Calderhead, 1996; Strauss, 1993; Thompson, 1992). This case study was an effort to begin investigating, from a developmental perspective, the conceptions and beliefs of two teachers as they refined their understandings of the fundamental principles and techniques of Reciprocal Teaching during a 6-week training intervention. The intervention consisted of a series of interactive workshops for the teachers that aimed to link their developing conceptions to their classroom practice. Before, midway, and after the series of four training sessions, we conducted clinical interviews and naturalistic observations that captured the teachers' perspectives of their own developing understanding of the procedures and principles of Reciprocal Teaching.

1. Theoretical framework

In the wake of the process-product approach to the study of teacher effectiveness (Koehler & Grouws, 1992), researchers have been concentrating on examining the beliefs and decision-making processes of expert and novice teachers. The current zeitgeist in teacher development revolves around viewing teachers themselves as thinking, active problem solvers, who use their beliefs and knowledge to make important decisions in the classroom (Carpenter, 1988; Dougherty, 1990; Fennema & Franke, 1992; National Research Council, NRC, 1999). The description of the theoretical framework will briefly review the literature on teachers' beliefs about reading comprehension strategy instruction and will move to a description of the procedures and principles involved in Reciprocal Teaching that are salient to our data collection and analysis.

1.1. Knowledge and beliefs about reading comprehension strategy instruction

Palincsar, Stevens, and Gavelek (1989) and Duffy (1993a) attempted to address the issue of teacher beliefs with regard to their respective programs for implementing reading comprehension instruction. Despite notable differences in their approaches, both Palincsar and Duffy placed the teacher at the center of his or her own professional development. In their development programs, the authors focused on the teachers' self-confidence as well as the beliefs they held about themselves as teachers in the context of reading instruction.

Our focus in this investigation, however, is on the teachers' cognitions of Reciprocal Teaching and on the ways in which their beliefs may affect their practice. A study by Marks et al. (1993) offers insights into teachers' thinking about Reciprocal Teaching. The authors examined three teachers who had incorporated "think-pair-share" and "question-response cue" forms of strategy instruction into Reciprocal Teaching sessions. Marks et al. hypothesized that such more "workable" forms of Reciprocal Teaching would facilitate implementation of the techniques involved. Instead, the authors found that the teachers were engaging in "lethal mutations"; that is, they were altering Reciprocal Teaching in ways that did not reflect the learning principles on which it is based. The primary goal of the teachers in the Marks et al. study was to promote students' interest and engagement in reading. While a worthwhile goal in itself, the teachers were not implementing the Reciprocal Teaching objectives of improving students' reading comprehension strategies. In addition, comprehension monitoring was not cited as a goal by any of the three teachers in the Marks et al. (1993) study. One teacher commented that even if she knew that the technique had no effect on her students' reading comprehension ability, she would still use it because she believed that her version of Reciprocal Teaching gave her students greater enthusiasm about reading and academics.

Teacher departures from the learning principles of Reciprocal Teaching was also the focus of other

investigations. For example, Mosenthal, Schwartz and MacIssac (1992) found that preservice teachers believed that the strategies must proceed in a set order of “steps” during every session, and that this misconception was very resistant to change. Similarly, the teachers expressed the belief that Reciprocal Teaching was a bad idea because if children thought they would need to engage in all four steps every time they read, it would make reading even less appealing. These misunderstandings are clearly hurdles that teachers need to transcend if they are to understand why and how Reciprocal Teaching can be effective for improving their students’ reading comprehension abilities.

The cognitive approach to studying teacher effectiveness, described above, promises to provide information that will assist researchers to better understand good teaching, and in turn to formulate more effective teacher education programs and interventions. Our work stands out from previous studies in two ways. First, we hypothesized that examining teachers’ general beliefs is not as effective as examining their beliefs about a specific instructional technique, such as Reciprocal Teaching. We argue that the information gleaned from domain-specific investigations, such as ours, will be of more practical value for teacher educators than general notions of teacher thinking. This is supported by teacher knowledge experts who distinguish between general pedagogical knowledge and pedagogical content knowledge (Fennema et al., 1996; Grossman, 1989; Grossman & Stodolsky, 1995; Shulman, 1987). Later we make some specific suggestions to this effect. Second, we claim that studying the development of teacher thinking in an instructional setting would be particularly useful to those revamping teacher education programs across North America, which has been the focus of activity in many Colleges of Education in the United States. By understanding the specific techniques and activities that are responsible for the development of important pedagogical concepts may just be the most effective way to understand the nature and course of the development of teacher thinking.

1.2. *Reciprocal Teaching*

In this section, we highlight the important aspects of the procedures and principles of Reciprocal Teaching as intended by its developers. For more detailed information, we invite the reader to consult the research (Collins, Brown, & Newman, 1989; Palincsar, 1991; Palincsar & Brown, 1984).

1.2.1. *The procedures*

Reciprocal Teaching is carried out with a small group of children (four to six children is typical, but using larger groups has been successful) and a teacher, all of whom work together to read a passage. A small part of the passage is read aloud or silently, depending on the age and ability level of the group. After the passage has been read, the “learning leader” is responsible for helping the small group comprehend what was read by verbally engaging in four expert reading strategies: questioning, clarifying, summarizing, and predicting (Palincsar, 1991; Palincsar & Klenk, 1992). In each Reciprocal Teaching session, the teacher is the first learning leader. After the teacher models expert strategy use, each child in turn is given the responsibility of being the learning leader. The teacher and other students are constantly helping the learning leader to perform the four strategies, but the learning leader must actually do the questioning, clarifying, summarizing, and predicting by him or herself (Brown & Campione, 1996; Palincsar, 1991; Palincsar & Brown, 1984; Rosenshine & Meister, 1994).

Engaging in these four strategies encourages students to monitor their own comprehension. For example, if a student is unable to summarize the main point of a paragraph, it is likely that he or she did not comprehend the main point. Here, the strategy fosters comprehension because it signals to the student that he or she needs to reread to comprehend the main point, rather than continue reading without understanding (Brown, Palincsar, & Armbruster, 1984).

1.2.2. *The principles*

Brown and Campione (1996) stressed that there are key principles of learning and instruction that

underpin the technique of Reciprocal Teaching. Palincsar (1991) focused on four principles in a chapter she wrote for teachers. These principles include cognitive apprenticeship (Collins et al., 1989), theories of scaffolding (Wood, Bruner, & Ross, 1976), the zone of proximal development (ZPD) (Vygotsky, 1978), and proleptic teaching (Brown & Palincsar, 1989; Palincsar, 1991).

The model of cognitive apprenticeship provides a framework for all the activity that occurs during a Reciprocal Teaching session. The learning leader takes on the role of the expert who demonstrates correct use of comprehension monitoring strategies for other group members. Group members become more proficient readers as the expert provides guidance when needed and controls the transfer of cognitive responsibility to the students. All the instruction and expert guidance is conducted within the context of the entire task, enabling the students to reflect on their development in the context of the overall purposes of the activity.

A scaffold is a structure that supports an activity, mental or physical, while development of skill is ongoing. Scaffolding takes the form of hints, cues, questions, and discussion that are designed to assist the learner to develop task-related skills. The process of scaffolding is almost entirely dependent on the expert's understanding of the learner's ability and knowledge at any given point (Bruer, 1993). Within the context of Reciprocal Teaching, the learning leader benefits from understanding the typical developmental progression of students learning to engage in expert reading strategies, such as summarizing. Common scaffolds for the development of summarizing are providing praise, prompting children to use particular words to begin their summaries, and even modeling part of the process for the children to mimic.

Vygotsky (1978) referred to the difference between the child's performance alone and the child's performance with help from a more expert person as the ZPD. The ZPD is central to the techniques of Reciprocal Teaching. A child learning how to summarize, for example, will not be able to formulate an expert summary, and thus will have to be scaffolded to higher levels of

performance by the teacher. The teacher's role is to constantly evaluate the child's developing skill and to teach to the upper limit of the child's ZPD.

Proleptic teaching is defined as teaching in anticipation of competence (Brown, Campione, Ferrara, Reeve, & Palincsar, 1991). A proleptic teacher could be described as one who has high expectations and believes in his or her students' ability to meet them. Regardless of a student's perceived ability or level of intelligence, the teacher assumes that the student is capable and will eventually be able to accomplish the task as an expert would. In contrast, instruction that embodies a hierarchical stepwise pattern (Gagné, 1962, 1985) communicates to the children that all a teacher expects is the mastery of one point in development, which, according to Palincsar (1991), is an inefficient use of instructional time.

2. Method

We used a case study methodology (Yin, 1994) to address the following questions: As they undergo training, what are the meanings the two teachers ascribe to the four expert strategies used in Reciprocal Teaching (questioning, summarizing, clarifying, and predicting) and four of the learning principles upon which Reciprocal Teaching is built (cognitive apprenticeship, scaffolding, ZPD, and proleptic teaching)? How do the conceptions of the teachers change over the course of training?

2.1. Research site

The research site was a midwestern middle-level (grades 6, 7, and 8) magnet school, located in an urban environment with a population of over 63% minority. Twenty-five percent of the district population were children under 18 years old, of which 42% lived in single parent homes. Nearly 40% lived in poverty, and the median family income in this district was approximately \$30,000 (Office of Social and Economic Data Analysis, 1996).

The school was involved in a full-scale implementation of the integration of three instructional

programs designed and tested by cognitive scientists (Lamon et al., 1996). The system, entitled Schools for Thought (SFT, Bruer, 1993), teaches students thinking skills as well as discipline-specific content knowledge by integrating Fostering Communities of Learners (Brown & Campione, 1990), Computer Supported Intentional Learning Environments (CSILE, Bereiter & Scardamalia, 1989), and the Jasper Woodbury Adventure Series (Cognition and Technology Group at Vanderbilt, 1997). As part of the Fostering Communities of Learners program, children conduct Reciprocal Teaching sessions to understand the articles they uncover during self-directed research activity. Sustained small-group activity culminates in a group research report and the completion of what is called a “consequential task”, evaluated by individuals inside and outside the classroom. Thus, teachers at SFT sites possess varied levels of familiarity with Reciprocal Teaching, depending on prior experience and the types of in-service professional development that is available to them.

2.2. Participants

A pilot study was conducted several months before the present study began at the same site with several teachers interested in improving their implementation of Reciprocal Teaching. Work with these teachers allowed us to approach two language arts teachers, Evita and Rick (pseudonyms), who agreed to participate in the present study because they were interested in improving their practice.

Evita, a Caucasian woman, was nearing the end of her first year teaching at SFT. Prior to this, she taught language arts in a military-base school in Germany for several years. Although she expressed a sense of being overwhelmed by the program’s demands and the disciplinary issues of an inner-city school, Evita was remarkably eager to learn about the SFT program. Initial conversations with her revealed that she talked about teaching and learning in terms of her students’ thoughts and the learning environment she provided. Evita enjoyed observing her students succeeding; she was enthusiastic when speaking of her students’ efforts, insights, and abilities.

Rick, an African-American man, was at the end of his second year teaching for SFT. He had recently participated in a 1-day professional development session on Reciprocal Teaching, but was nevertheless grateful for the opportunity to receive additional formal training. He indicated during the second interview that, “up to now, [he’d] been doing mostly trial and error” in his attempts to use Reciprocal Teaching as a technique in his classroom. He was dedicated to SFT and learning more about the program.

2.3. Training intervention

The training intervention, created specifically for our study, was designed according to human learning principles (Anderson et al., 1995; Blumenfeld, Hicks, & Krajcik, 1996; Calderhead, 1996), and was similar in structure to that conducted by Palincsar and Brown (1984) in the original Reciprocal Teaching study. As in the original study, the field researcher (first author) and teachers participated in Reciprocal Teaching sessions together, and the texts used were intended to create a setting that was conducive to cognitive apprenticeship modeling processes (Collins et al., 1989). In contrast to Palincsar and Brown, the texts used in our training also presented information on the four procedures and four principles. To elicit beliefs about teaching and learning (see Hollingsworth, 1989; Palincsar et al., 1989), the teachers in this study were required to produce written rationales for their current and projected Reciprocal Teaching practices (Anderson et al., 1995; Blumenfeld et al., 1996; Shuell, 1996).

In describing the training activities in the following section, the use of the first person singular (I) will refer to the first author who conducted all the training and data collection activity. Four separate training sessions were conducted, during which both teachers were present. To guide the discussion of the first session, overheads were used that listed my background, the format of the training, and an introduction to the procedures and principles of Reciprocal Teaching. We began the session by watching videotaped clips of Reciprocal Teaching, which stimulated a great deal of discussion and questions

from the two teachers about the procedures involved. Following the discussion, I introduced brief definitions of each principle, as well as examples and non-examples of each, the latter of which were presented as written vignettes of teachers either adhering to or violating the principles.

The second training session began with a Reciprocal Teaching session using a text (Appendix A) that reviewed the procedures and the principles discussed in the first session. As in session one, more time was spent discussing the procedures than the principles. After the review, we discussed a graphical illustration of two hypothetical students' zones of proximal development (Appendix B) for the skill of summarizing (Palincsar & Brown, 1984). In addition, a set of examples of actual student summaries was provided and briefly discussed at the close of the training session.

Training session three began with a review of the ZPD illustration used in session two. To promote understanding of the role scaffolding plays in a cognitive apprenticeship, we spent the remainder of the session engaging in Reciprocal Teaching. Two different texts were used (Appendix C). The first focused on cognitive apprenticeship (Shuell, 1996), and the second text focused on scaffolding (Webb & Palincsar, 1996). During this activity, I modeled several different scaffolding techniques, which were listed on a handout (Appendix D) that I provided for the teachers. I asked the teachers to think about their own scaffolding techniques and be ready to discuss their reflections at the subsequent training session.

The fourth and last session of the training began with a scaffolding wrap-up. The teachers reviewed an excerpt of dialogue of a teacher scaffolding her

students in a Reciprocal Teaching session and subsequently compared the depicted scaffolding with their own practice. A brief discussion ensued about the relationship between the ZPD and cognitive development, which had been a source of discussion from previous training sessions and interviews.

The main activity during the session focused on specifying rationales for instructional strategies, which I modeled for the teachers using my own rationale for present and future Reciprocal Teaching practice. The participants were then asked to construct and share their own rationales to the group.

2.4. Data collection

The three phases of data collection, spanning a 6-week period, are outlined in Fig. 1. During Phase I, before the first two training sessions took place (T1 and T2), the participants were individually interviewed on their conceptions of procedures and principles (clinical interviewing techniques were used; see Ginsberg, 1997). At the beginning of each interview, the participant was asked to use a node-link structure to create a graphical representation of his or her current understanding of the four procedures and principles, all on the same piece of paper. The participants then spent the remainder of the interview explaining and elaborating their representation to the interviewer, responding to prepared questions as well as interviewer prompts.

Also before the training began, the two teachers were observed in their respective classrooms (Bogdan & Biklin, 1998) as they implemented Reciprocal Teaching with their students. During the classroom observations, the field researcher took detailed hand-written fieldnotes document-

	PHASE I			PHASE II			PHASE III			
	Week 1		Week 2	Week 3	Week 4		Week 5	Week 6		
Activity	I/O	T1	T2	A1	I/O	T3	A2	T4	I/O	A3

Fig. 1. Data collection schedule. Interviews and Observations (I/O) were conducted before training session one (T1), after the first two training sessions (T1, T2), and after training was completed with the fourth session (T4). Three sets of analyses were conducted, A1, A2, and A3.

ing the teachers' implementations of Reciprocal Teaching. The fieldnotes were a record, or a play-by-play account, of the teachers' main actions of the observed Reciprocal Teaching session. During Phase II of data collection, another round of individual interviews and classroom observations took place before the third training session (T3). In Phase III, a third round of interviews and observations was conducted after the fourth and final training session (T4). Thus, the data consisted of interview transcripts, the participants' graphical representations, classroom field notes, and the interactions that took place during the training sessions, which were also audio-recorded, video-recorded, and transcribed. Detailed analyses (A1, A2, and A3) occurred during and after the data collection phases.

2.5. Coding procedures

In each phase of data collection, data were collected on two consecutive days (interview on day 1 and observation on day 2) and transcription of audiotapes began immediately thereafter. After the data for the phase were collected (including the data collected during the training sessions), the data were coded using eight major codes: the four procedures of Reciprocal Teaching (questioning, clarifying, summarizing, and predicting) and the four principles of interest (cognitive apprenticeship, ZPD, scaffolding, and proleptic teaching). This major coding involved simply identifying when the participant was talking about or obviously engaging in one of the eight major codes. Observational data were primarily used to triangulate the teachers' understanding of the procedures, that is when teachers helped students to summarize, what did the teacher do? The teachers' understanding of the principles was not easily observable in their practice; thus, observations were rarely coded for understanding of principles.

Once all data within a phase were coded with the eight major codes, the text segments from all data sources (interviews, observations, and training) were entered into conceptually clustered chronological matrices. These are separate grids for each of the eight major codes designed to facilitate the

interpretation and creation of pattern codes by visually and spatially organizing the narrative data.

At this point, pattern coding commenced, which involved the interpretation of the data clustered within the descriptive or major code categories (Miles & Huberman, 1984). Each of the major code matrices was printed and coded for different patterns of thought or ideas expressed by the participant. At the end of each pattern coding session, I also used the pattern code lists to create concept maps in reflexive journals to solidify my understandings of the data; these processes alerted me to biases, and helped me to formalize a list of pattern codes for member checks. The data were then entered into pattern code matrices for each of the pattern codes generated.

Discussions with a peer debriefer (Lincoln & Guba, 1985) concluded the data analysis process for Phases I and II. The peer debriefer had a specialist degree in School Psychology and had previously been enrolled in two graduate-level courses during which Reciprocal Teaching and learning principles were discussed. The peer debriefer's role was to challenge the pattern codes, ask for clarification and specification of vague codes, and offer alternative interpretations of the data.

Finally, inter-rater reliability for the coding schemes was obtained, with the assistance of an experienced certified special education teacher. She was given the pattern codes and matrices for each major code with at least 10% of randomly selected text segments from each phase. Therefore, for each major code, 30% of each participant's data was used to test the coding scheme. Multiple codes were assigned to each text segment. A match was assigned when both primary and secondary rater assigned the same code to a segment. The total number of possible codes was the number of possible matches. Thus, if the secondary coder assigned a code that was not assigned by the primary, it became a possible match and vice versa. An inter-rater reliability of 70% was obtained for Rick's coding scheme, 75% for Evita's. The reliability for Rick was lower primarily due to the coding of the "clarifying" procedure

for which the primary coder (first author) assigned a greater number of codes to each text segment than the secondary.

3. Results

Our analyses suggested that the evolution of teachers' conceptual development revealed several misconceptions about both the principles and procedures of Reciprocal Teaching as well as cognitive growth during the intervention. We discuss these findings in turn; our discussion includes various commonalities in the teachers' cognitive development, such as cognitive "re-lapses" and the unconscious tendency to resist change.

3.1. Misinterpretation of principles

As expected, the principles were difficult for participants to understand (Brown & Campione, 1996; Lamon et al., 1996). The teachers' understanding of the ZPD was particularly interesting because the participants interpreted this principle according to their personal preconceptions of the

nature of knowledge and its construction. When describing the ZPD, Rick revealed a "staircase model" of learning when he talked about how students would develop their knowledge "one step at a time", would not go back to lower steps, and could not move on to the next step until the one they were working on was finished. In contrast, Evita's model resembled a modified version of the information processing metaphor (Atkinson & Shiffrin, 1968; Strauss & Shilony, 1994) in which students add ideas to their brains, link multiple ideas in networks, and develop ideas by reflecting on them and creating new links. Evita's drawings in Fig. 2 illustrate how she was visualizing these connections. One prominent difference between the information processing account and Evita's model, however, is that while the former is a metaphor, Evita posited that ideas are contained in physical spaces in the brain, which she called the ZPD.

In training sessions three and four, the researcher tried to dispel the idea that the ZPD was a physical place in the brain, but Evita's comments during the last interview suggested that she was still working from this premise. She seemed to sum up her thoughts about the ZPD when she

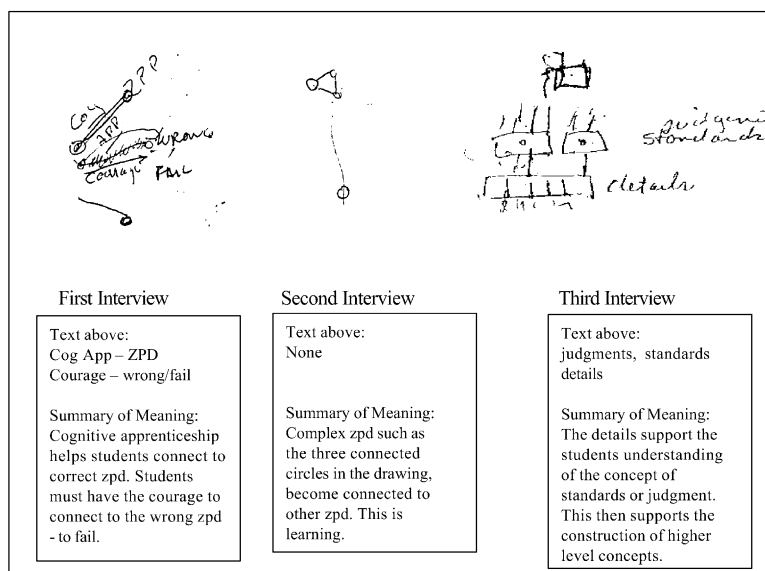


Fig. 2. Evita's drawings from the first, second, and third interviews illustrating ZPDs building on each other.

explained the “advancing in thought process” comment on her concept map, as so:

Advancing in thought processes, okay, moving onto what we were talking about as the complex. I call it a complex. Other people call it other things I suppose. Or the next zone of proximal development. I think those are the same things for me. Okay, because I see a complex like this [pointing to the third interview drawing in Figure 2]. And like if I say fear, okay what kind of things invoke fear or what kind of things do we feel when we fear something. Uh, we get uh goosebumps [laughs]. Okay, we sweat. Things like that. Uh, we make strange faces and all these things, and then we have this, which is fear, which is now in our memory and categorized by these particular details. Okay? So that is, for me, that would be a zone of proximal development that we have reached and categorized and set in our memories. And now we use THIS to get to higher order complexes or zones. And thought expansion or connections, or connecting, making those connections from one main idea to another main idea, to another main idea, to another main idea.

In accordance with the belief that knowledge acquisition is additive, Evita talked about scaffolding as a foundation of knowledge on which to build more knowledge instead of as the forms of assistance an expert provides to a novice. Evita thought that the “scaffold of information” would support students’ ability to learn, that one would sort ideas in the scaffold in order of importance, and that it was the teacher’s job to ascertain and fix any problems in the scaffold of information. Such an “additive” model was reflected in Rick’s thoughts as well, although in a different way. Rick used the word coaching as a synonym for scaffolding, and thought that he was coaching students to obtain knowledge. Nevertheless, his ultimate goal was to add the knowledge in the text to the students’ minds.

Rick interpreted cognitive apprenticeship as a process of knowledge acquisition during which his role was to coach, or facilitate, the acquisition process. Evita’s definition of cognitive

apprenticeship was a “selective process” and although this notion is consistent with Reciprocal Teaching, it is not the meaning of cognitive apprenticeship. The notion of a “selective process” is discussed below under conceptual growth because it represents an accurate interpretation of one aspect of Reciprocal Teaching.

Proleptic teaching was difficult for the teachers, largely because the word proleptic is uncommon, but also because the idea itself is not trivial. Rick changed his mind several times about its meaning. At one time he believed it meant adjusting to the level of the group, and at a later point he thought it meant verifying that students understand or move at an accelerated pace. Evita believed she was being proleptic when she engaged in Reciprocal Teaching sessions that contained no corrective feedback. Although it is true that all students should be able to engage in the Reciprocal Teaching procedures at their current level of ability without reproof, it is still necessary for the teacher to assist them to achieve higher levels of ability.

3.2. *Misinterpretation of procedures*

Brown and Campione (1996) reasoned that teachers “lethally mutated” Reciprocal Teaching because they did not understand the learning principles upon which the procedures were based. The current investigation uncovered, however, that teachers can experience significant difficulty when trying to understand the procedures in and of themselves. Speece, MacDonald, Kilsheimer, and Krist (1997) noted that clarifying and questioning are sometimes confusing for teachers, but they did not elaborate on how these two procedures were being confused or why. Our case studies shed some light on the probable reasons for common misinterpretations.

It seems that both participants initially confused the clarifying and questioning procedures. During questioning, the goal is for students to ask questions about the text that help explicate the main ideas of the passage. During clarifying, the goal is to elucidate unknown vocabulary and concepts. Our analyses revealed the difficulties the teachers were experiencing stemmed from the

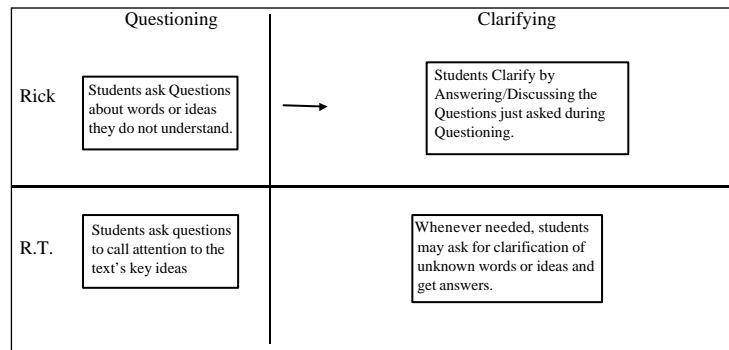


Fig. 3. Rick's understanding of questioning and clarifying procedures compared to original Reciprocal Teaching (R.T.) questioning and clarifying procedures.

fact that (a) both of the procedures involve asking questions, (b) students usually raise questions in school when something is not understood, and (c) the everyday understanding of the word “clarify” is to explain something in more detail. The following paragraphs detail the evolution of the two participants' understanding of questioning and clarifying.

As illustrated in Fig. 3, Rick resisted the notion that the questioning procedure was anything different from the questions students typically ask in class. As a result, Rick was performing the clarifying procedure thinking it was the questioning procedure. He believed that the first part of the clarifying procedure, when the students ask the question, was the questioning procedure. He was simply breaking clarifying up into two steps, and therefore not engaging in any actual Reciprocal Teaching questioning. As the transcript excerpt in Fig. 4 conveys, during the second training session, Rick seemed to understand the clarifying procedure, but by the second interview he had again confused questioning and clarifying. It appears that Rick experienced the type of regression to prior understanding that Siegler (1996) illustrated using an overlapping wave metaphor of development.

In contrast to Rick, Evita was correctly engaging in the questioning procedure, but not the clarifying procedure. During training, she was forced to construct an understanding of clarifying, and her solution was to make the clarifying

procedure the point in time when the teacher would clarify or discuss the main idea of the reading. Specifically, Evita decided that she would begin by asking the students “concentrated questions” that would clarify the main idea of the text; this way she would be helping them to “get” the important information in the text to add to their foundation of information.

It becomes easier to understand Evita's response when one considers that, in everyday parlance, to clarify is to make the meaning of something clear. Evita explained that when people engage in reading:

The ideas of each sentence, of each paragraph, are sometimes in the sentence but we do not clarify them. They do not hit us in the face. They do not hit the students in the face. So this is a process of making the students eliminate unnecessary words and unnecessary information to get at the main ideas of the sentence, and those ideas are the ZPDs.

Therefore, Evita was not combining clarifying and questioning as Rick did. She was simply using the word “clarify” to describe the process of helping the students distill the main ideas from the text by engaging them in the Reciprocal Teaching questioning procedure. In fact, during the second training session, this issue surfaced and Evita stated, “using questions helps to clarify summarizing”. The researcher repeated this phrase with a questioning tone of voice and Evita responded

Researcher: Do you want to ask a question? Would you like me to?

Rick: What do you mean by, I'm confused when it says difficult terminology or concepts.

Evita: Okay, um, that would mean, um, okay, and let's see... would I answer this or would the students answer this?

Researcher: Either one.

Evita: Either one. Okay.

Researcher: Whatever you would prefer.

Evita: I just wanted to ask. And uh, that would mean when you don't understand the word, or a group of words, and then you would bring it to the group's attention that this meaning is missing and that you need information.

Researcher: For example, what you just did. You asked for us to clarify a sentence. [R: Okay] That's part of Reciprocal Teaching. That's clarifying.

Rick: Okay, that's really different.

Researcher: Okay, that is, that is what the clarifying procedure is. That's the definition of it, is what you just did. Difficult words, difficult ideas....

Rick: At times, um, depending on the time allocated, would it be advisable to let the students look up different um terminology in the dictionary? Or just go ahead and give them the meaning of it?

Researcher: Often your students will be able to help, and if they can't, go grab a dictionary. Whatever you feel is appropriate for the students that you are working with.

Rick: Okay.

Fig. 4. Rick's ideas about clarifying and questioning are challenged in the second training session.

with, "Helps to, ...maybe clarifying isn't the word I want. ...Um, help to be...helps to define summaries". The discussion about the meaning of clarifying continued, and then Evita stated, "Okay, let's try this. Questioning, um, organizes the information to be able to make a clearer summary". This notion is an accurate understanding of questioning, and may be used to help teachers in future professional development sessions.

Predicting was more straightforward than questioning and clarifying for the teachers to understand and implement. At one point, however, the teachers were confused about whether the predicting should be about what would come next in the text or what would happen next in future situations outside the parameters of the text.

Although a discussion about the future might be educationally worthwhile, the goal of predicting in Reciprocal Teaching is to aid reading comprehension. Therefore, Evita, Rick, and the researcher agreed that when engaging in predicting during Reciprocal Teaching sessions, it should be constrained to discussing what will occur next in the text.

Summarizing was the easiest procedure for the teachers to understand. Nevertheless, they asked questions about whether the summaries should be constructed by individual students or by groups of students, believing a summary constructed by many students would capture more of the information in the text. The researcher explained that their adaptations were acceptable as long as the focus was on helping all students generate main

idea summaries. In general, both Evita and Rick understood this procedure and helped their students to successfully perform it.

3.3. *Conceptual growth*

3.3.1. *Beliefs about procedures*

By the end of the training, Evita and Rick were both successfully implementing all four procedures in their classroom Reciprocal Teaching sessions. The teachers' beliefs of the procedures of clarifying and questioning were where the greatest cognitive growth occurred for both teachers, but their ideas about the other two procedures might also be worthwhile to share with teachers in future professional development efforts.

Evita developed sophisticated ideas about the questioning procedure. From the beginning, she stated that the answers to the questions had to be in the text. She pointed out that her students were then forced to view the text differently because they were required to know the answer to their question before they asked it. Later, she expanded on this idea by stating that to form a question, the students would need to scan the text and select out important information. In the final interview, she noted that there were three levels of questions that students ask: sorting detail questions, detail with main idea questions, and main idea questions. Finally, she pointed out that the questions help students to identify ideas for both clarifying and summarizing.

In addition, she came to understand clarifying as the time when the group ascertains whether there are any comprehension problems or any words that are not understood. The images she used to describe the functions of all the procedures were particularly striking. Using the metaphor of a funnel, Evita described how the questions were the first step in narrowing down what the students should attend to. Clarifying helped narrow the funnel by directing attention. Summarizing, then, was an opportunity for students to sort through all the details of the text and choose the most important ones. Finally, predicting opened the funnel wide again (an hourglass may have been a more appropriate metaphor). Another metaphor she used was of casting a net. Predicting cast a

wide net that was gradually pulled in with each subsequent procedure until the summary phase, which included only the main idea. These were sophisticated ideas and revealed an understanding of Reciprocal Teaching and student cognition that was not anticipated.

Rick also revealed worthwhile insights about the procedures. During the final interview, Rick emphasized that the students should be the ones engaging in these procedures so that they could think for themselves and develop thinking skills. Rick also noted that the students' summaries were feedback for him to ascertain how well they understood the text. Rick claimed that students' predictions were also good feedback, noting that if the predictions were accurate then the first three procedures (questioning, clarifying, and summarizing) had accomplished the goal of helping the students understand the information in the text. Evita also believed that the students "digested the meaning" of the text using the first three procedures, and she added that predicting was an opportunity for the students to review the text and further develop their understanding.

3.3.2. *Beliefs about principles*

With regard to the principles, the teachers made significant progress, but did not fully understand any of them by the end of the training. This may be because, when broadly framed, the principles are not particularly useful for teachers engaging in specific instructional practice. For example, [Tharp and Gallimore \(1989\)](#) asserted that the metaphor of scaffolding is convoluted and confusing in terms of what it means for practice. Tharp and Gallimore suggested it is perhaps more useful to talk about different forms of assistance that teachers can provide such as modeling, questioning, and revoicing. Indeed, Rick asked a very good question during training: How does a teacher build a scaffold around students? What should one do? These are legitimate questions, the answers to which are not self-evident. This is further supported by the fact that value and meaning of the metaphor of scaffolding has undergone significant analyses in the literature ([McCaslin & Hickey, 2001](#); [Palincsar, 1998](#); [Stone, 1998](#)).

Rick's knowledge of the principles was incomplete at the end of the investigation, but he did capture several essential aspects of the concepts. For example, although Rick began with very little knowledge of scaffolding, he did realize that the goal was to decrease his scaffolding (or "coaching") over time so that the students would become independent. With regard to his understanding of cognitive apprenticeship, he determined that the goal was learning. In this sense, Rick was accurate in believing that Reciprocal Teaching was a cognitive apprenticeship because clarifying and questioning produce understanding. What was not clear is whether he considered the students' increasing levels of competence while assisting them to engage in clarifying and questioning.

Evita's thoughts about scaffolding were particularly interesting in that she had several good ideas, none of which was the definition of scaffolding. Despite Evita's inaccurate final definition of scaffolding as a "foundation of information" in students' minds, and her insistence that proleptic teaching meant that she would not give the students any "negative evidence" about their abilities, she was nevertheless using scaffolding appropriately in her classroom. For example, during one classroom Reciprocal Teaching session, a student was ignoring or misunderstanding Evita's request to ask a question that would have the answer in the text. The student repeatedly shared personal anecdotes to support a theory the student was proposing. In response to this, Evita asked, "What in the text supports your theory?", which successfully prompted the student to focus his attention back on understanding the text.

Another point worthy of discussion is that although Evita interpreted the metaphor of a scaffold to function as an informational foundation, she knew the meaning of a physical scaffold; she defined it as, "that kind of structure that you see around the buildings that, uh, is supportive so that you can reach higher and higher and higher".

It is additionally worthwhile to mention that Evita initially thought of scaffolding as the support systems a teacher must put in place before students can engage in an activity—for Reciprocal Teaching, this specifically meant the development of students' language skills. Evita was very explicit

with students about the language skills she expected during Reciprocal Teaching. She helped students to understand declarative and interrogative forms of discourse and the different word order that was required for each. During observations, Evita insisted that her students use full sentences. This practice is not an explicit part of Reciprocal Teaching, but it does not conflict with any of the supporting principles.

Finally, Evita used many concepts to define and describe cognitive apprenticeship, including the "selective process of getting main ideas out of the text". While this was not an accurate definition of cognitive apprenticeship, it is nevertheless an activity that occurs during Reciprocal Teaching sessions. The procedures are indeed a vehicle for students to engage in this cognitive "selective process" and thus her understandings of cognitive apprenticeship could be construed as a process, although vaguely articulated, of transferring higher-order reading skills to the students.

Evita also internalized the notion that Reciprocal Teaching helps students develop a sense of story structure or genre. She referred to this as a "structure apprenticeship", and discussed it when talking about cognitive apprenticeship. This is an impressive extension and a logical connection.

4. Discussion

The present case study attempted to characterize the development of two teachers' thinking as they engaged in four separate training sessions on Reciprocal Teaching. An important finding that emerged from the study is that it is not sufficient to simply "mention" (Mosenthal et al., 1992) Reciprocal Teaching in teacher education programs for the technique to be successfully learned and implemented correctly. This is consistent with other research efforts (Brown & Campione, 1996; Coley, Depinto, Craig, & Gardner, 1993; Lamon et al., 1996; Marks et al., 1993; Rosenshine & Meister, 1994; Speece et al., 1997), and provides a serious challenge for those interested in training teachers, at any level, to use instruction designed to improve students' reading comprehension skill.

Furthermore, we cannot claim, as [Brown and Campione \(1996\)](#) suggested, that understanding the principles of learning is necessary for successful implementation. Our work can, however, provide some guidance to those who help teachers learn about and implement Reciprocal Teaching in the classroom. Specifically, our findings are informative with respect to the types of activities that motivate teachers to learn about Reciprocal Teaching as well as the teachers' subsequent learning trajectories. We now have a much clearer idea of educators' cognitions as they are engaged in specific activities related to Reciprocal Teaching, and as a result, professional development specialists now have some interesting and productive hypotheses about supporting teachers' emerging understandings. Research such as ours is valuable because it uncovers various misconceptions about specific elements of constructive instructional activity, such as Reciprocal Teaching. Given the confusion between questioning and clarifying experienced by the teachers in this study, for example, a professional teacher educator might use a diagram, such as the one found in [Fig. 3](#), to explain the difference between these two procedures. In addition, it might be useful for teachers to reflect on their understandings by creating node-link representations of current understandings, thereby sharing more concrete representations of their beliefs to a trainer or co-trainee.

We also found that there can be differences between what teachers espouse and what they do ([Strauss & Shilony, 1994](#)). Evita, for example, was able to guide her students to engage effectively in comprehension monitoring strategies, but nonetheless struggled with the meaning of the term scaffolding throughout the intervention. This instance is similar to [Duffy's \(1993b\)](#) experience with a teacher who did not know the definitions of the terms he was trying to teach her, but was acting in ways that embodied those terms, thus supporting her students' learning efforts rather well. Effective professional development, therefore, would include activities that attempt to connect declarative knowledge related to Reciprocal Teaching with the associated procedural knowledge. Training activities might include watching and discussing videotapes of the tea-

chers' developing performance. In our case, it would have been particularly useful to indicate to Evita the instances where she was successfully engaging in scaffolding.

As [Palincsar et al. \(1989\)](#) argued, beliefs about teaching and learning must be addressed in professional development activities if teachers are to implement Reciprocal Teaching successfully. The participants' information processing conceptions of the mind clearly influenced their thinking about the principles, procedures, and goals of Reciprocal Teaching. In particular, the epistemological belief that learning is adding information to the mind made it difficult for teachers to understand and coordinate the dual goals of Reciprocal Teaching.

Indeed, the most difficult roadblock for both teachers was the existence of varying levels of ability in performing the procedures, and that the teacher's job is to help children advance in their own ability. It is possible that the model of "adding knowledge" interferes with the teachers' ability to construct an understanding of what "thinking strategies" are and how to teach them. If the teachers' goal was to add knowledge to their students' minds, which it appeared to be in this study, it would be safe to assume that they also believed that their role as an educator is to provide the knowledge, or at least show the students where the knowledge is. This view is, of course, antithetical to the philosophy of Reciprocal Teaching and any other instruction based on current constructivist theory ([Gardner, 1991](#); [NRC, 1999](#)). In Reciprocal Teaching, students are expected to construct their own understandings of the text as the teacher guides them to acquire and master the tools, or thinking strategies, with which to comprehend it. The rationales that the teachers produced during the intervention were useful in exposing such beliefs, but we did not devote enough time to making explicit comparisons to expert rationales. Furthermore, our observation that the teachers' views of cognition affected their ability to interpret the procedures and principles of Reciprocal Teaching suggests that explicitly addressing the theoretical cognitive implications of each of the procedures during training would have been productive. For

example, from an information processing perspective, the summarizing procedure is intended to chunk information in working memory so that storage and retrieval from long-term memory would be more successful. Although we did address the basic function of summarizing as identifying main ideas, we did not discuss it in terms of a model of cognition such as information processing. This is not addressed in the literature and may be a productive direction for redesign. Clearly, this leaves us with a way to improve the training for future efforts.

The rationales elicited during the intervention provided a window on some of the most important goals for language arts teachers, which influence their ability to successfully engage in reading instruction. Understanding their goals provides information to teacher educators on the reasons behind deviations from engaging in programs such as Reciprocal Teaching. For example, classroom managerial styles have been shown to occupy a great deal of novice teachers' cognitive space (Blumenfeld et al., 1996; Borko & Putnam, 1996). In the case of the Marks et al. (1993) study, in which teachers reported that their goal was to simultaneously promote active participation and to ensure adequate classroom management, such goals may deter teachers from engaging flexibly in scaffolding processes. More research is needed with respect to the relationship between teacher goals and Reciprocal Teaching implementation.

Another implication for teacher training programs is that teachers' beliefs should be elicited and addressed at more regular intervals throughout professional development. This is especially important because although this and other research can uncover some beliefs that may be typical, not all teachers will hold the same beliefs as Rick and Evita. For example, the findings of Marks et al. (1993) indicated that teachers were "unconcerned with literal memory and understanding" (p. 281). In fact, one of the reasons the teacher in the Marks et al. study wanted to use their version of Reciprocal Teaching was because they believed it discouraged students from asking factual questions. These teachers were apparently misconstruing the notion of avoiding the instruc-

tion of "isolated facts" to mean that instruction does not contain any facts at all. In those teachers' minds, literal understanding was not a goal, but rather something to be avoided altogether. Yet, reading for meaning and the understanding of facts and concepts is central to Reciprocal Teaching, especially within Fostering Communities of Learners (Brown & Campione, 1990).

It is evident that this type of research cannot end here; similar investigations need to be conducted with a greater number of teachers and a larger variety of training activities. It is also clear that teachers' cognitive development should be tracked during training sessions that expose their beliefs more frequently and provide better tools for reflection. Future research should also concentrate on the reading comprehension abilities of the teachers themselves, addressing the degree to which they possess the content knowledge critical to teaching Reciprocal Teaching (Shulman, 1986). Finally, we suggest that students learning to engage in Reciprocal Teaching may face some of the same cognitive challenges that these teachers experienced. For example, as Evita was able to scaffold but not able to explicate the correct meaning of the word, students may understand a paragraph but still not be able to summarize it. We thus urge researchers in teacher education to take these suggestions to heart when attempting to understand how teachers and their students learn about reading comprehension strategies.

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Appendix A. Teacher training materials

During Reciprocal Teaching sessions students begin by reading a passage either aloud or silently. After a meaningful chunk of text is read, students construct questions about important information in the text. By asking questions students identify what is important in the story. Consequently, the next task of summarizing is clearer. A summary is one or two sentences that contain the most important ideas. A good summary reflects a clear understanding of the reading.

It may be appropriate to clarify difficult terminology or concepts that come up during Reciprocal Teaching sessions. When a member of the Reciprocal Teaching group detects a breakdown in comprehension, he or she asks to have the point clarified by the group. Another opportunity to make sense of the text that may arise is when it is logical to ask for predictions. Often a text leaves the reader wondering what will happen next. At these times, students may wish to offer their predictions.

The teacher's role during Reciprocal Teaching is that of an expert reader who is apprenticing her students into the world of reading for meaning. To establish this cognitive apprenticeship, he or she is modeling his or her own expert thinking while reading processes during Reciprocal Teaching sessions. For example, talking about how they did not understand a word and need to clarify it.

Because the teacher adopts a proleptic teaching stance, the teacher always models expert thinking, regardless of where the child may be in their development. The teacher knows the typical development students go through when they learn to question and summarize. The teacher therefore scaffolds the student expand to the next level they may attain. This level may be one, two, or three steps further in development, depending on the student's ZPD. The teacher, as a scaffold, only helps when it is necessary and often lets the student struggle within their ZPD. Often this involves a great deal of fun and encouragement, including supporting efforts to predict future passages in the text.

Appendix B. ZPD for summarizing—two hypothetical cases

5—main idea invention summary	5—main idea invention summary
4—long lists with some inventions	4—long lists with some inventions
3—long lists of selections	3—long lists of selections
2—a few selections	2—a few selections
1—cannot summarize alone	1—cannot summarize alone
AMY	BETSY

Appendix C

Text retyped from:

Shuell, T. J. (1996). Teaching and learning in a classroom context. In D. C. Berliner & R. C. Calfee (Eds.), *Handbook of educational psychology* (pp. 726–764). MacMillan: New York.

Learning is a natural process that often occurs with the assistance of another individual or an artifact created by another individual (e.g., a book [fiction or non-fiction], movie, instructional manual, video). There is a tendency to associate teaching with schools, but a great deal of our learning from instruction occurs outside of school from parents, friends, and other individuals with whom we come in contact. The way in which we learn outside of school, however, often is very different from the way students are expected to learn in school.

The educational value of apprenticeships has long been recognized in many non-school situations. When an individual wishes to establish expertise in a particular field, for instance, he or she becomes an apprentice to an established expert in the field who helps that individual acquire the knowledge and skills characteristic of experts in that field. The person initially learns by observing and performing tasks that represent only a small part of the overall task. Through these and subsequent observations (modeling), coaching from the mentor, practice on increasingly more complex tasks, and progressive fading of instructional support, the apprentice gradually develops

the competence of the mentor. These characteristics are evident in the various apprenticeship models that have been suggested for use in the schools.

Text retyped from:

Webb, N. M., & Palincsar, A. S. (1996). Group processes in the classroom. In D. C. Berliner & R. C. Calfee (Eds.), *Handbook of educational psychology* (pp. 865–866). MacMillan: New York.

Scaffolding. Scaffolding is a “process that enables a child or novice to solve a problem, carry out a task, or achieve a goal which would be beyond his unassisted efforts” (Wood et al., 1976, p. 90). In teacher scaffolding, the teacher explains and models the behavior that he or she wants students to engage in, gives them opportunities to demonstrate that behavior, provides feedback on their performance, and gradually provides less assistance as students become more competent at displaying the desired behavior (Palincsar & Brown, 1984). Palincsar and Brown (1984) developed teacher-scaffolded instruction, referred to as Reciprocal Teaching, to help students carry out certain strategies designed to improve comprehension of text: generating questions about the text they have read, clarifying what they do not understand, summarizing the text, and generating predictions. Teachers initially take the leadership in explaining the strategies and modeling their use in making sense of the text. Then the teachers ask students to demonstrate the strategies, but give them considerable support. For example, to help a student generate questions to ask other students, the teacher might probe what information the student gleans from the text, and help the student phrase a

specific question using that information. The teacher gradually assumes the less active role of coach, giving students feedback and encouraging them, as shown in the excerpt in Figure 26–3. Using this approach, students learn how to engage in the strategies for reading comprehension with minimal intervention from the teacher and make major gains in reading comprehension (Brown & Palincsar, 1989; Palincsar, 1986; Palincsar & Brown, 1984).

Appendix D

Different ways to scaffold

1. Prompting—“What question did you think a teacher might ask?”
2. Instruction—“Remember, a summary is a shortened version, it doesn’t include all the detail”.
3. Modifying activity—“If you are having a hard time thinking of a question, why don’t you summarize first?”
4. Praise and feedback—“You asked that question well; it was very clear what information you wanted”.
5. Modeling activity that needs improvement—“A question I would have asked would be...”.
6. Explicitly telling students that the strategies are ways people help themselves understand what they are reading. That it will help them to do the strategies whenever they are reading. That they should practice them when they are reading books of all kinds (Palincsar & Brown, 1984).

Other suggested tips for scaffolding

Courtesy of Mary Ellen Vogt, former president of the California State Reading Association

Predicting

I think _____

I bet _____

I wonder _____

I predict _____

Questioning

(Brown & Palincsar, 1984)

A question I want to ask that starts with the word (Who, what, why, etc...)

I wonder _____

Who? _____

Where? _____

What? _____

When? _____

Why? _____

I'm curious about _____

Clarifying

This is confusing to me. I need to _____ (reread, slow down, look at illustrations or graphs, try to figure this word out, etc...)

Summarizing

In my own words, this is about _____

The main point of this was _____

Overall this was about _____

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