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Abstract

In this study we examined how preparation in elaborated help giving affects students' helping behavior and learning in reading. Primary- (grades 2 and 3, $n = 15$) and intermediate- (grade 4, $n = 9$) level classrooms were assigned randomly to a contrast treatment or to collaborative reading activities with or without preparation in elaborated helping. Teachers conducted training and implemented treatments for 21 weeks. From each class we pre- and posttested the reading comprehension performance of 3 students representing points on the achievement continuum, and we coded helping behavior during classroom observations. Across grade levels, students who prepared for elaborated help giving corrected more errors and engaged in more elaborated helping; across treatments, intermediate students demonstrated more correcting and more elaborated help giving than did primary counterparts. In reading comprehension, intermediate students improved more with elaborated helping, but primary students improved more without elaborated help giving. We discuss findings in terms of developmental stages of reading and teachers' use of group work in reading.

The learning profiles of public school classrooms in this country are becoming increasingly diverse (Hodgkinson, 1995; Stallings, 1995): Research (e.g., Jenkins, Jewell, Leceister, Jenkins, & Troutner, 1990) has shown that some classrooms incorporate students whose performance levels span on average more than five grades. Such academic heterogeneity strains the capacity of conventional instructional methods, whereby teachers deliver uniform lessons: Whole-class, didactic instruction frequently fails to address many students' learning needs.

At the same time, research has demonstrated that students' academic competence

can improve when they work in collaborative groups on structured learning activities (D. Fuchs, Fuchs, Mathes, & Simmons, 1997; Greenwood, Delquadri, & Hall, 1989; Palincsar & Brown, 1984; Rosenshine & Meister, 1994; Stevens, Madden, Slavin, & Farnish, 1987). In light of its demonstrated efficacy, along with the instructional planning challenges associated with heterogeneous groups of learners, collaborative group work has been incorporated in increasing numbers of classrooms for greater amounts of time (Antil, Jenkins, Wayne, & Vadasy, in press). With collaborative group work, students can work on different levels of curricula and rely on varying instructional methods. In these ways teachers can decenter the learning process to create simultaneous "lessons" that better address the range of learning needs in classrooms.

As teachers incorporate and adapt validated forms of collaborative learning, it is important to note that students require careful guidance to interact effectively during collaborative work. Research has illustrated how, without such guidance, low-achieving students frequently are omitted from group dynamics (O'Connor & Jenkins, 1996), open-ended discussions and explanations often are problematic and confused (Cooper & Cooper, 1984; Michaels & Bruce, 1991; Palincsar & Brown, 1989), and students tend to rely on lectures and demonstrations while providing few opportunities for peers to apply information (Fuchs, Fuchs, Bentz, Phillips, & Hamlett, 1994; Webb, Troper, & Fall, 1995). Moreover, research has shown that students do not develop effective interactional styles as a natural consequence of participating in collaborative learning activities (Kohler & Greenwood, 1990).

These demonstrations are important because long-standing research programs (e.g., King, 1992; Webb, 1991) have documented that student learning in collaborative arrangements depends on the quality of student interactions, and some work specifies which interactional styles are related to student learning. Most of this research has been conducted in the area of mathematics, where one major recurring finding is that student learning is associated with students' provision of elaborated help (Nattiv, 1994; Swing & Peterson, 1982; Webb & Farivar, 1994). With elaborated help, students help classmates construct their own correct responses rather than providing peers with correct answers or simply telling them that answers are wrong. Theoretical support for this empirical demonstration is found in a generative model of learning (Wittrock, 1989), which argues that individuals solidify or extend their own understandings when they elaborate on those understandings.

Despite these persuasive findings in mathematics, the contribution of elaborated help giving has not been examined within reading group work. This is noteworthy because at least four validated collaborative reading programs exist. Greenwood and colleagues (e.g., Greenwood et al., 1989) developed classwide peer tutoring where students, working in pairs, read aloud while partners identify and correct errors. A partner asks the other student who, what, why, where, and when questions, and then they switch roles and repeat activities. With peer-assisted learning strategies (PALS; D. Fuchs et al., 1997) students work in pairs on partner reading, retellings, and prediction and summary activities. In cooperative integrated reading and composition (CIRC; Stevens et al., 1987), mixed-ability learning teams work on partner reading, decoding, story structure, and prediction and summary activities. And reciprocal teaching (Palincsar & Brown, 1984) has students read expository material, paragraph by paragraph, while generating questions, summarizing, clarifying, and predicting. In the early stages of reciprocal teaching, teachers model the use of these strategies; gradually, however, teachers shift responsibility for mediating discussions to students. Increasingly, sessions become dialogues among students as they support each other and al-

ternate between prompting the use of a strategy, applying and verbalizing that strategy, and commenting on the application.

Although reciprocal teaching may implicitly encourage elaborated helping among students, no research in reading has examined the contribution of elaborated help giving to observed outcomes during collaborative group work. Moreover, none of these four major approaches to collaborative reading activities provides teachers with methods for teaching students how to incorporate elaborated help giving.

Therefore, on the one hand, persuasive evidence exists supporting the importance of elaborated help giving during collaborative group work in mathematics. On the other hand, there is a lack of research on how elaborated helping contributes to student learning during collaborative work in reading. By analogy, although instructional methods exist for preparing students to provide elaborated help in mathematics (e.g., Farivar & Webb, 1991), corresponding instructional procedures have not been developed for helping students learn how to incorporate this form of help during reading work.

The purpose of this study was to develop and examine the effects of an explicit approach to teaching students to engage in elaborated help giving during collaborative group work in reading. We developed a set of lessons specific to reading for teaching students elaborated help-giving methods. These lessons were designed so they could be applied across collaborative reading approaches. Then, we assessed the effects of that training on the types of help students provided each other as well as on student learning.

We incorporated three treatments: collaborative reading activities with preparation in elaborated help giving, collaborative reading activities without preparation in elaborated help giving, and contrast (i.e., no collaborative reading activities). Teachers conducted all training and implemented treatments in their naturally constituted classroom for 21 weeks. We examined effects for students at primary (grades 2 and 3) and intermediate (grade 4) levels and for students with varying learning histories (i.e., at risk because of chronic learning and social behavior problems, average achieving, and high achieving). Results may be important to researchers as they extend collaborative reading approaches and seek to understand which dimensions of collaborative work in reading account for improvements in student learning. Findings may also be useful to teachers as they consider methods for optimizing the effects of collaborative reading activities in their classrooms.

Method

To assist readers in tracking the activities undertaken in this study, we provide a timeline in Table 1.

Participants

Teachers. Participants were 15 general education teachers at primary grades 2 and 3 (three at grade 2 and 12 at grade 3) and nine general education teachers at intermediate grade 4. To be eligible to participate, teachers had to include students with chronic reading difficulties and problematic social behaviors every day in their reading instruction. While stratifying by grade level, we randomly assigned teachers to two treatments: collaborative reading activities, operationalized with peer-assisted learning strategies (PALS; $N = 10$ at grades 2–3, $N = 6$ at grade 4) or contrast (i.e., no collaborative reading activities; $N = 5$ at grades 2–3, $N = 3$ at grade 4). Then we randomly assigned half the PALS teachers at each grade to a treatment that included preparation in help-giving strategies. We therefore had two experimental groups: PALS and PALS-HG. Chi-square analyses indicated no relation between treatment and gender, race, highest degree earned, or years teaching (see Table 2).

Students. Teachers implemented their

TABLE 1. Timeline of Study Activities by Condition

Week	Conditions[a] PALS	PALS-HG	CONT	Activity
1–2	X	X	X	Pretests administered.
3	X	X		Teacher workshops (one for PALS; one for PALS-HG) occurred.
4–8	X			PALS teachers trained students.
4–12		X		PALS-HG teachers trained students.
4–13	X	X		PALS/PALS-HG implemented three times/week.
16–20	X	X		Fidelity checks occurred.
22–23	X	X		Student interaction data collected.
24–25	X	X	X	Posttests administered.

[a]PALS = peer-assisted learning strategies; PALS-HG = PALS with help-giving training; CONT = contrast.

respective treatments with all students in their reading classes. To specify research participants for whom treatment effects would be assessed, each teacher identified three students: (*a*) one who, as judged by the teacher, was manifesting social behavior difficulties that permeated the school day, including reading instruction, (*b*) one student who demonstrated no chronic behavior problems and whose reading performance, as judged by the teacher, was near the middle of the class, and (*c*) one student who also demonstrated no chronic behavior problems and whose reading performance, as judged by the teacher, was near the top of the class. We refer to these three students, respectively, as at risk (AR), average achieving (AA), and high achieving (HA). We conducted one between-classroom (treatment: PALS-HG vs. PALS vs. contrast) and one within-classroom (student type: AR vs. AA vs. HA) analysis of variance (ANOVA) on students' age; there were no significant effects. Chi-square tests indicated no relation between treatment and students' race, free/reduced-price lunch status, or gender (see Table 3).

Base/Contrast Treatment

All 24 teachers structured their reading programs using the district's basal program, *Treasury of Literature* (Farr & Strickland, 1995). According to the authors, this series is an integrated reading and language arts program in which reading is conceptualized as an interactive process of constructing meaning. The program emphasizes meaning-based instruction, builds on the language understandings children bring from home, and incorporates a strong focus on authentic literature. This curriculum guided the format of instruction across PALS, PALS-HG, and contrast classrooms. No contrast teacher routinely implemented any collaborative learning program.

Experimental Treatments

The two experimental treatments were PALS and PALS-HG. We present treatment information in five segments: (*a*) background information about and rationale for PALS, (*b*) operationalization of the PALS methods, (*c*) commonalities and differences between PALS and PALS-HG, (*d*) teacher training, and (*e*) fidelity of implementation.

PALS: Background and rationale. PALS incorporated structured activities, with frequent verbal interaction and feedback between tutors and tutees and with reciprocity of tutoring roles (so that both children served as tutor and tutee in each session). In PALS we relied on structured interactions because previous research (Fitz-Gibbon, 1977; Michaels & Bruce, 1991; Palincsar & Brown, 1989) indicates that open-ended discussions are often problematic, con-

TABLE 2. Teacher Demographic Data by Grade Level and Condition

	Grades 2–3			Grade 4		
	PALS	PALS-HG	CONT	PALS	PALS-HG	CONT
Gender: Male	0	0	1	0	0	0
Race:						
African-American	0	1	1	1	0	0
European-American	4	4	3	2	3	3
Asian-American	1	0	1	0	0	0
Degree:						
Bachelor's	2	2	4	1	0	2
Master's	3	3	1	2	3	1
Years teaching:						
1–4	0	1	1	0	0	0
5–9	2	0	3	1	0	1
10–14	0	0	0	0	0	0
15–19	0	1	1	1	1	0
20+	3	3	0	1	2	2

NOTE.—Data reported are *n*'s.

fused, and ineffective. We built into PALS frequent interaction and feedback, along with role reciprocity, because research has documented the potential for appropriate feedback for learner responses (Walberg, 1984), opportunity for learner responding (e.g., Greenwood et al., 1989), and reciprocity (Simmons, Fuchs, Fuchs, Hodge, & Mathes, 1994; Top & Osguthorpe, 1987; Wiegmann, Dansereau, & Patterson, 1992) to enhance learning.

Each PALS session comprised three activities: partner reading, paragraph shrinking (which is similar to paragraph summarization), and prediction relay. Partner reading with brief retellings was incorporated because prior work demonstrated its feasibility and potential value within PALS as an activity for improving reading accuracy and fluency (Simmons et al., 1994).

Summarization was selected because it requires readers (*a*) to monitor comprehension and make judgments in the selection and reduction of textual information (Palincsar & Brown, 1984), (*b*) to allocate attention to the major content and check to see if they have understood it (Palincsar & Brown, 1984), and (*c*) as an application of the generative-process model of reading, to elaborate on the information provided in text (Doctorow, Wittrock, & Marks, 1978). Moreover, research has demonstrated that, although summarization is still difficult for many high school students (Brown & Day, 1983), practice in paragraph summaries that require identification of main ideas enhances reading comprehension (e.g., Bean & Steenwyk, 1984; Paris, Cross, & Lipson, 1984; Rinehart, Stahl, & Erickson, 1986).

Prediction activities were incorporated because they may be an important strategic behavior among expert readers who, according to Palincsar and Brown (1984), proceed through text until a "triggering event" alerts them to a comprehension failure, which then prompts "debugging activities." One commonly experienced triggering event is the realization that an expectation about text has not been confirmed; this assumes that expert readers automatically formulate ongoing predictions as they read. Research has documented, however, that young and poor readers have difficulty evaluating text for internal consistency and compatibility with known facts (Markman, 1981), and that the ability to interpret what will occur next in text develops slowly (Collins & Smith, 1982). Prediction activities are designed to help students develop and automatize the strategic behavior of formulating and checking predictions about text by overtly practicing that strategy. In the work

TABLE 3. Student Demographic Data by Grade Level and Condition

	Grades 2–3									Grade 4								
	PALS			PALS-HG			CONT			PALS			PALS-HG			CONT		
	X	(SD)	*n*	*X*	(SD)	*n*	*X*	(SD)	*n*	*X*	(SD)	*n*	*X*	(SD)	*n*	*X*	(SD)	*n*
At-risk:																		
Age	8.67	(.47)		8.77	(.85)		8.72	(.70)		10.29	(.36)		9.53	(.59)		10.35	(.77)	
Gender: Male			5			5			4			3			2			2
Free lunch			2			2			3			2			2			1
Race: African-American			4			3			4			0			2			3
Average achieving:																		
Age	8.81	(.76)		8.48	(.38)		8.53	(.64)		10.15	(.94)		9.87	(.48)		9.89	(.41)	
Gender: Male			2			3			2			1			2			2
Free lunch			1			0			2			2			1			1
Race: African-American			2			2			1			2			1			1
High achieving:																		
Age	8.47	(.49)		8.87	(.70)		8.72	(.78)		10.17	(.03)		9.81	(.56)		9.80	(.39)	
Gender: Male			4			4			2			1			2			2
Free lunch			0			1			0			1			1			2
Race: African-American			0			1			0			2			1			1
Across:																		
Age	8.65	(.44)		8.70	(.51)		8.66	(.69)		10.20	(.44)		9.73	(.35)		10.01	(.31)	
Gender: Male			11			12			8			5			6			6
Free lunch			3			3			5			5			4			4
Race: African-American			6			6			5			4			4			5

of Palincsar and Brown (1984), practice in formulating predictions was associated with improvements in reading comprehension.

Peer-assisted learning strategies has been shown to be effective for improving reading fluency and comprehension across learning-disabled, low-achieving, and average-achieving students (D. Fuchs et al., 1997). In light of efficacy data, PALS was awarded the U.S. Department of Education Program Effectiveness Panel's certificate of effectiveness.

PALS procedures. Each week participating teachers incorporated three 35-minute PALS sessions into their existing allocated reading time. Teachers taught the PALS lessons to and conducted PALS with all children in their naturally constituted classes. The 6–10 lessons (depending on how teachers divided up the material) incorporated brief teacher presentations, student recitation of information and application of principles, and teacher feedback on student implementation. Each lesson lasted 30–60 minutes (see D. Fuchs, Fuchs, Mathes, & Simmons, 1995, for manual). We provided materials with which teachers implemented PALS in their classrooms for 21 weeks: scripts to assist teachers in teaching the PALS routines to students and folders of materials for student use.

During PALS every student in the class was paired; each pair included a higher- and lower-performing student. The teacher determined pairings by ranking the class in terms of reading competence, doing a median split, and pairing the highest performer from the top half with the highest performer from the bottom half and so on. Although tutoring roles were reciprocal, the higher-performing student read first for each activity to serve as a model for the other student. Both students read from material appropriate for the lower reader. Typically, this material was not the basal text but rather literature the teacher selected to represent the appropriate reading difficulty level.

Pairs were assigned to one of two teams for which they earned points. Points were awarded for completing reading activities correctly and demonstrating appropriate tutoring behavior. Each pair kept track of points on a consecutively numbered score card, which represented joint effort and achievement. Each time a student earned a point, the tutor slashed the next number. In addition, as teachers led PALS sessions, they circulated and awarded points (slashed numbers) to reward cooperative behavior and correct tutoring methods. At the end of the week, each pair reported the last number slashed on the score card as the pair's total, the teacher summed each team's points, and the class applauded the winning team. Every 4 weeks, the teacher formulated new pair and team assignments. Thus, the motivational system combined competitive (team vs. team) and cooperative (combined effort of the pair) structures.

Every day the first PALS activity was partner reading, designed to improve students' reading accuracy and fluency. Each student read aloud connected text for 5 minutes, for a total of 10 minutes of sustained reading. The higher-performing student read first; the lower-performing student reread the same material. After both students read, the lower-performing student retold for 2 minutes the sequence of what had occurred in the text. Students earned 1 point for each correctly read sentence (if a correction was required, a point was awarded after the sentence had been read correctly) and 10 points for the retell.

The second PALS activity, designed to develop comprehension through summarization and main idea identification, was paragraph shrinking. Continuing to read subsequent sections of text, students read orally one paragraph at a time, stopping to identify its main idea. Tutors guided the identification of the main idea by asking readers to identify (*a*) who or what the paragraph was mainly about and (*b*) the most important thing about the who or what. Readers were required to put these two

pieces of information together in 10 or fewer words. For each summary, students earned 1 point for correctly identifying the who or what, 1 point for correctly stating the most important thing, and 1 point for using 10 or fewer words. Students continued to monitor and correct reading errors, but points no longer were awarded on a sentence-by-sentence basis. After 5 minutes the students switched roles.

The last activity, prediction relay, extended paragraph shrinking to larger portions of text and required students to formulate and (dis)confirm predictions. The activity comprised five steps: The reader made a prediction about what would be learned on the next half page, read the half page aloud while the tutor identified and corrected reading errors, (dis)confirmed the prediction, and summarized the main idea of the half page. Students earned 1 point for each viable prediction, 1 point for reading each half page, 1 point for accurately (dis)confirming each prediction, and 1 point for each component (i.e., the who or what, what mainly happened, and 10 or fewer words) of each summary. After 5 minutes, the students switched roles. For each PALS activity, students were taught a standard correction procedure (listed in Table 4).

Commonalities and differences between PALS and PALS-HG. The PALS-HG condition incorporated the same dyadic structure, the same three activities (partner reading with brief retellings, paragraph shrinking, and prediction relay), and the same score cards and team structure. The major difference between PALS and PALS-HG was that, rather than teaching the PALS correction procedure for each activity (which often provided the reader with a correct response), PALS-HG teachers taught their students specific strategies designed to help partners figure out correct responses on their own. (See Table 4 for a list of strategies by PALS activity.) The first lesson began with a discussion about watching readers carefully to determine when they need help. Teachers showed a videotape of a PALS dyad as one student experienced difficulty. The teachers led a discussion of what the nature of the student's problem might be. Then for each specific strategy teachers showed a video clip of the same two students as the tutor relied on the target strategy to provide help and led a discussion in which students discussed how the tutor's assistance illustrated the strategy. After each strategy was illustrated and discussed, teachers showed a video of the same tutor using multiple helping strategies and led a discussion in which students commented on the various strategies employed. This was followed immediately by a PALS session, after which students described the help they provided and classified that help by strategy. Teachers conducted helping lessons after each PALS activity had been taught to and mastered by students. For example, after partner reading had been taught and practiced for 2 weeks, PALS-HG teachers presented the lessons covering the helping strategies for partner reading (see Table 4).

We were concerned that the point structure, which encouraged students to work efficiently and correctly, might discourage students from using the helping strategies, because use of the helping strategies interrupted text reading for longer durations than the standard PALS correction methods. We therefore modified the point structure for PALS-HG as follows. Students did not award their own points for successful completion of activities. Rather, teachers awarded all points, and students earned those points for good tutoring behavior and for specific use of helping strategies. Teachers coded the points they awarded for helping. That is, instead of slashing a number, teachers wrote a letter through the number; the letter was coded to stand for the strategy the teacher had observed.

Teacher training in PALS. We assigned each teacher a research assistant (RA) who served as consultant to the teacher during the study. Teachers participated in a full-day workshop, conducted separately for

TABLE 4. PALS Correction and HG Strategies by PALS Activity

Activity	Condition	
	PALS Correction	HG Strategies
Partner reading: Helping reader figure out words	Step 1: Coach says, "Stop, you missed that word. Can you figure it out?" Reader figures out word within 4 seconds. Step 2: Coach says, "Good. Read that sentence again." OR Step 1: Coach says, "Stop, you missed that word. Can you figure it out?" Step 2: Coach counts to four, then tells the word. Step 3: Coach asks, "What word?" Reader says word. Step 4: Coach says, "Good. Read that sentence again."	Step 1: Coach says, "Stop, you missed that word. Can you figure it out?" Reader figures out word within 4 seconds. Step 2: Coach says, "Good. Read that sentence again." OR Step 1: Coach says, "Stop, you missed that word. Can you figure it out?" Step 2: Coach counts to four, then helps reader by: Helping reader use context; Helping reader use the vowel sound(s); Saying the word very slowly for the reader; Covering up the word and slowly uncovering each part, while asking reader to say each part. If after two strategies reader is still unable to figure out word, coach gives word and goes on. Step 3: Coach asks, "What word?" Reader says word. Step 4: Coach says, "Good. Read that sentence again."
Paragraph shrinking: Helping reader figure out (*a*) who/what paragraph is about and (*b*) what mainly happened	Step 1: Coach says, "That's not quite right. Skim the paragraph and try again." Step 2: Reader skims paragraph and tries to answer the missed question. Coach decides to give points or give answer.	Step 1: Coach says, "That's not quite right." Step 2: Coach offers to help by: Asking reader questions that begin with who, what, when, where, why, or how; Asking reader to reread first and last sentence in the paragraph; Choosing a part of the paragraph that gives the main idea and asking reader to reread it. If after two strategies the reader is still unable to answer question, coach gives answer and goes on.
Helping reader shrink main idea statements	Step 1: Coach repeats, "Say the main idea in 10 or fewer words."	Step 1: Coach tells reader to "Shrink it." Step 2: Coach helps by: Repeating reader's statement, counting words with fingers; Asking reader what words can be left out or what parts can be shortened. If reader changes main idea, reminds reader to use same idea originally stated. Step 3: If still incorrect, coach gives answer and goes on.
Prediction relay: Helping reader make good predictions	Step 1: Coach says, "I don't agree. Think of a better prediction."	Step 1: Coach helps by: Asking reader questions that begin with who, what, when, where, why, or how; Asking reader to retell the last half page; Reviewing last half page and asking reader to retell it; Rereading last paragraph. If after two strategies reader is still unable to make a reasonable prediction, coach gives answer and goes on.

PALS and PALS-HG teachers, in which RAs modeled and teachers role-played PALS activities. Then we discussed the methods by which teachers would train their own classes. After this workshop, RAs met with teachers in their classrooms once every 1–2 weeks for 5–10 minutes to help solve implementation problems. In addition, RAs observed teachers conduct all PALS lessons and provided corrective feedback as required.

PALS fidelity. Two weeks after the last PALS lessons had been taught we assessed with direct observation the accuracy with which teachers implemented PALS. The RAs were trained in a 1-hour session to conduct and score the observations, which listed each required PALS or PALS-HG element. In every classroom, an observer (who was not the RA assigned as consultant to that class) observed the teacher and three dyads, each one including the AR student, the AA student, or the HA student. In each classroom each target student was observed participating in one of the three PALS activities. Across classrooms we counterbalanced the order in which AR, AA, and HA students were observed (i.e., the activity during which the observation occurred). We maintained the counterbalancing to the greatest extent possible; nevertheless, daily events (e.g., children going to the bathroom) sometimes required us to alter the planned order in which targets were observed. Because each student was not observed participating in each activity, data are not reported by student type.

Observers judged whether the teacher or student conducted each element correctly and wrote yes, no, or not applicable; the score was the percentage of correctly conducted elements. Because of considerable stability in implementation accuracy (D. Fuchs et al., 1997), we measured fidelity at one point in time. Percentage of agreement, calculated across all four observers in three classrooms, ranged between 85 and 93. (In this article, percentage of agreement = [agreement between raters A and B/(agreements between A and B + disagreements between A and B + omissions)] × 100; see Coulter, cited in Thompson, White, & Morgan, 1982.) For PALS and PALS-HG, respectively, the percentage of correctly implemented elements was 98.20 (SD = 2.28) and 97.45 (SD = 4.17), $F(1, 14) = .25$, N.S.

Measures

Learning. To assess student learning, we used the reading comprehension subtest of the third edition of the Stanford Diagnostic Reading Test (Karlsen & Gardner, 1986). We used Form G: the red level at grade 2 and the green level at grades 3 and 4. As described in the test manual, because the SDRT is a diagnostic instrument, it differs from most survey tests in that it provides more detailed coverage of reading skills and places more emphasis on the lower achiever by including more relatively easy items. At the red level, the SDRT includes 28 items that require sentence reading and 20 items that involve paragraph comprehension. At the green level, the measure includes 24 literal and 24 inferential comprehension items, all in response to paragraphs. At the red level, Kuder-Richardson reliability was .93 and the standard error of measurement was 2.4; at the green level, reliability was .94 and the standard error of measurement was 2.6 (Karlsen & Gardner, 1986). These technical data are for raw scores, which is the datum we used in analyses. (The maximum test score at both levels is 48, making transformation of raw scores into percentages unnecessary.)

Student help. For PALS and PALS-HG conditions, we assessed the nature of the help students provided with in situ observations that occurred in classrooms during regularly scheduled PALS and PALS-HG sessions. These in situ observations were conducted to determine how tutors responded to partners' difficulties.

We observed three dyads per classroom, one containing each of the target students (AR, AA, and HA). As with the fidelity data, each target student was observed par-

ticipating in one of the three PALS activities, and, across classrooms, we counterbalanced the order in which target students were observed. As with the fidelity data, unpredictable events sometimes required us to modify the planned order in which we observed targets. Because we did not observe every student participating in every activity, we aggregated findings across student types. Students were not aware that observations were being conducted.

A structured observation system was used in which RAs noted each time an error occurred, thereby providing the tutor with an opportunity to provide help. For each error the RA noted whether the tutor provided a correction or not. For each error where the tutor provided a correction, the RA noted whether or not that help represented one of the methods shown in Table 4 or some other viable form of elaborated helping. We coded data as (*a*) the percentage of errors tutors corrected and (*b*) of the errors corrected, the percentage for which tutors relied on any of the HG strategies they had been taught. Agreement, assessed on two observations, averaged 77.9% for percentage of errors corrected and 83.3% for percentage of errors for which tutors relied on HG strategies.

Data Collection

Reading achievement tests were administered immediately before and after treatment by RAs who had been trained in standard test administration. The in situ observations characterizing the nature of help students provided during PALS were conducted during weeks 22 and 23 of the study.

Results

Learning and helping data are shown in Tables 5 and 6, respectively. For the learning data we treated student type (AR vs. AA vs. HA) as a within-classroom factor for the following reasons: It allowed us to (*a*) use classroom as the unit of analysis (given that classrooms, not students, had been assigned to treatments), (*b*) compare directly the achievement levels of students within the same classrooms, and (*c*) test interactions between student type and treatment. (Using classroom as the unit of analysis is identical to using teacher as the unit of analysis.) For the helping data, results were aggregated across the three types of students, and again, classroom was treated as the unit of analysis. Preliminary analyses indicated that students' race and gender did not mediate effects; consequently, we did not incorporate those variables into subsequent analyses. In following up significant effects we used the Fisher LSD post hoc procedure (Seaman, Levin, & Serlin, 1991) to evaluate pairwise comparisons. To calculate effect sizes when growth data were not involved we used the difference between means divided by the pooled standard deviation (Hedges & Olkin, 1985); for data involving growth we used the difference between the growths divided by the quantity: pooled standard deviation of the growth/the square root of 2(1-*rxy*) (Glass, McGaw, & Smith, 1981). Effect size can be interpreted in the same way as *z*-scores, that is, the difference between means standardized in terms of standard deviation units. According to convention, a small effect size is .20; a medium effect, .50; and a large effect, .70.

Learning

Pretreatment. On pretreatment scores (see Table 5), we conducted a three-factor (treatment [PALS-HG vs. PALS vs. contrast], grade level [primary vs. intermediate], type of student [AR vs. AA vs. HA]) ANOVA, with repeated measures on the last factor. This analysis revealed a significant effect for student type, $F(2, 36) = 23.58$, $p < .001$. The Fisher LSD post hoc procedure indicated that across the three treatment groups initial reading performance was as follows: AR < AA < HA, thus verifying students' differential reading status at the beginning of the study. Effect sizes (ESs) were: for AR versus AA, −.85; for AR

TABLE 5. Student Learning Data by Grade Level and Condition

	Grades 2–3						Grade 4					
	PALS		PALS-HG		CONT		PALS		PALS-HG		CONT	
	X	(SD)	*X*	(SD)	*X*	(SD)	*X*	(SD)	*X*	(SD)	*X*	(SD)
At-risk:												
Pre	28.80	(10.69)	33.60	(13.35)	32.40	(13.46)	30.67	(10.21)	35.00	(18.36)	25.67	(12.50)
Post	38.00	(13.15)	33.20	(11.90)	36.00	(10.65)	38.67	(4.04)	47.00	(1.00)	24.33	(17.39)
Growth	9.20	(8.79)	−.40	(3.51)	3.60	(7.37)	8.00	(6.25)	12.00	(17.58)	−1.33	(5.03)
Average achieving:												
Pre	32.00	(2.83)	39.20	(4.66)	35.80	(4.55)	42.33	(2.08)	41.33	(3.21)	40.33	(2.08)
Post	42.60	(6.50)	44.00	(3.08)	38.40	(6.91)	42.33	(4.04)	46.00	(1.00)	42.33	(2.52)
Growth	10.60	(8.14)	4.80	(2.59)	2.60	(2.79)	.00	(2.65)	4.67	(4.16)	2.00	(1.00)
High achieving:												
Pre	43.80	(3.27)	46.20	(.84)	45.60	(2.30)	46.67	(1.15)	46.00	(1.00)	45.33	(2.08)
Post	45.00	(7.19)	46.60	(1.14)	45.60	(1.30)	47.33	(1.15)	47.67	(.58)	44.00	(2.00)
Growth	1.20	(1.10)	.40	(1.52)	.00	(3.00)	.67	(1.16)	1.67	(.58)	−1.33	(1.53)
Across student type:												
Pre	34.87	(3.83)	39.67	(4.29)	37.93	(6.44)	39.89	(4.23)	40.78	(7.03)	37.11	(5.12)
Post	41.87	(5.56)	41.27	(3.73)	40.00	(6.12)	42.78	(3.02)	46.89	(.19)	36.89	(6.50)
Growth	7.00	(2.95)	1.60	(1.38)	2.07	(2.06)	2.89	(1.35)	6.11	(6.83)	−.22	(1.39)

TABLE 6. Helping Data by Grade Level and Condition

	Grades 2–3				Grade 4			
	PALS		PALS-HG		PALS		PALS-HG	
	X	(SD)	X	(SD)	X	(SD)	X	(SD)
Percent errors corrected	.25	(.11)	.60	(.27)	.54	(.48)	.86	(.22)
Percent errors corrected with HG strategy	.00	(.00)	.39	(.17)	.39	(.17)	.97	(.27)

versus HA, −2.10; and for AA versus HA, −2.19.

No other effect was statistically significant: treatment, $F(2, 18) = .88$; grade level, $F(1, 18) = .92$; grade × treatment, $F(2, 18) = .87$; grade × type of student, $F(2, 36) = 1.01$; treatment × type of student, $F(4, 36) = .29$; and the three-way interaction, $F(4, 36) = .33$. Because no significant effect involved the treatment factor, pretreatment differences applied across the three treatments and therefore did not threaten the study's validity.

Growth. We conducted an analogous three-factor ANOVA on pre- to posttreatment growth (see Table 5). (This analysis yields F ratios analogous to those produced with four-factor analysis that includes measurement trial as a factor.) Significant effects were identified for the grade × treatment interaction, $F(2, 18) = 4.23$, $p < .05$, and student type, $F(2, 36) = 3.75$, $p < .001$. Other, nonsignificant effects were: for treatment, $F(2, 18) = 3.00$; for grade, $F(1, 18) = .25$; for grade × student type, $F(2, 36) = 1.32$; for treatment × student type, $F(4, 36) = .65$; and for the three-way interaction, $F(4, 36) = 1.57$.

With respect to the significant grade × treatment interaction, the Fisher LSD post hoc procedure indicated that at the primary level PALS students outperformed PALS-HG (ES = 1.05) and contrast (ES = .76) students; PALS-HG and contrast students grew comparably (ES = −.16). By contrast, at the intermediate level PALS-HG students outperformed PALS (ES = .72) and contrast (ES = .98) students; PALS and contrast students performed comparably (ES = .52).

Although not central to the purpose of this article, the significant student type effect was followed up with the Fisher LSD post hoc procedure. It revealed that across the three treatment groups students grew as follows: HA < AA = AR. The ESs were: AR versus AA = .05; AR versus HA = .70; AA versus HA = 1.35.

Student Help

The percentage of errors corrected and the percentage of those corrected errors for which tutors relied on HG strategies are shown in Table 6 by grade level and by PALS and PALS-HG treatments. On each of these two percentages we ran a two-way ANOVA (treatment and grade level).

On the percentage of errors corrected the ANOVA produced two significant main effects: for treatment, $F(1, 12) = 8.02$, $p < .01$, and for grade level, $F(1, 12) = 13.27$, $p < .001$. The nonsignificant $F(1, 12)$ value for the interaction was 1.02. Means for the PALS and PALS-HG treatments, respectively, were .34 (SD = .21) and .72 (SD = .30); for the primary and intermediate levels, respectively, .43 (SD = .19) and .74 (SD = .40). The treatment effect was associated with an ES of 1.46; the grade level effect, with an ES of 1.19. With respect to the interaction, ESs comparing the PALS and PALS-HG treatments at the primary and intermediate grade levels, respectively, were 1.84 and 1.10.

On the percentage of corrected errors for which tutors relied on HG strategies, the ANOVA produced two significant main effects: for treatment, $F(1, 12) = 17.97$, $p < .001$, and for grade level, $F(1, 12) = 6.29$, p

< .05. The nonsignificant $F(1, 12)$ value for the interaction was .83. For the treatment main effect (PALS mean = .10 and SD = .20; PALS-HG mean = .44 and SD = .17), the ES was 1.84. For the grade level main effect (primary-grade mean = .19 and SD = .23; intermediate-grade mean = .40 and SD = .23) the ES was .91. With respect to the interaction, at the primary and intermediate grade levels, respectively, ESs comparing the PALS and PALS-HG treatments were 2.24 and .76.

Discussion

Before discussing findings, we briefly review the strengths and limitations of this study. With respect to strengths, treatments were implemented under relatively naturalistic conditions whereby teachers conducted all training and all PALS sessions with everyone in their existing classes. Treatment duration was also respectably long, lasting for most of the school year, and fidelity was measured and found to be strong. In addition, classroom was used as the statistical unit of analysis, enabling us to examine effects for the three types of learners within and controlling for classrooms.

Despite these strengths, it is important to note two critical limitations. First, our use of the Stanford Diagnostic Reading Test, which is designed for lower-achieving students, may have been insufficiently sensitive to the kinds of progress the high achievers in our study may have realized. Second, our help-giving treatment was necessarily confounded with the point-giving structure, so that PALS students earned points for proceeding efficiently through material, whereas PALS-HG students earned points for engaging in the elaborated help-giving methods. We review each limitation later, within the context of the effects we observed.

Our findings show that grade level and treatment exerted statistically significant and practically sizable effects on the kinds of help students provided their peers. On the percentage of errors corrected and the percentage of errors for which students applied elaborated help giving, primary students across the PALS and PALS-HG conditions performed lower than did intermediate students (ESs = .90 and .91). Among younger and older children, on both indices, students who had received the help-giving lessons performed higher than those who had not (ESs = 1.34 and 1.84).

The main effect for treatment was sustained among younger and older students, as revealed in the absence of statistically significant interactions and as suggested in the large treatment effect sizes for both younger and older students. Nevertheless, given the grade-level main effect, it is interesting to examine helping, with and without the help-giving lessons, for each age group separately. Primary-grade students without the elaborated help-giving lessons corrected only one of every four errors and failed to demonstrate even one instance of elaborated help giving. With the elaborated help-giving lessons the performance of primary students did, however, improve so that the elaborative help-giving, primary-level group corrected more than 50% of errors and relied on elaborated help for nearly 40% of the corrections they offered.

Nevertheless, even with this sizable improvement, the performance of these primary-grade PALS-HG students only approached that of the intermediate-age PALS students—who did not have the benefit of the help-giving lessons. This reflects the fact that these older students exhibited some spontaneous use of elaborated help giving and corrected over twice as many errors as their younger counterparts who had not received the PALS-HG lessons. Moreover, with preparation in elaborated helping, fourth-grade students corrected an even higher proportion of the errors their partners committed and relied on elaborated help for nearly all of those corrections.

In light of the corresponding literature in mathematics, it is interesting to reflect on three points related to these findings. First,

although older students who did not receive the special help-giving lessons performed better than their younger counterparts who also did not receive the training, the rates of corrections and elaborated help giving among these older untrained students were disappointingly low: They corrected only half the errors their partners committed and applied elaborated help for only two of every five errors they corrected. Moreover, the younger students without preparation in elaborated help giving exhibited no instance of this form of helping. This finding echoes previous research (e.g., L. Fuchs et al., 1994; Kohler & Greenwood, 1990) indicating that students do not necessarily develop productive collaborative work styles simply as a function of participating in peer-mediated activities.

Second, results indicate that across age levels, explicit training can lead to student interactions that incorporate greater reliance on elaborated help giving. This finding corroborates intervention work conducted in mathematics with both intermediate- (Webb & Farivar, 1994) and primary-level students (L. Fuchs, Fuchs, Hamlett, Phillips, Karns, & Dutka, 1997). Third and relatedly, despite the responsivity of students at both age levels to the treatment, results suggest increasing capacity with age to provide elaborated help to peers. This finding seems sensible in light of children's increasing developmental verbal facility. Nevertheless, the mathematics literature has not explored the effects of age on patterns of elaborated help giving.

Of course, in the area of mathematics, experimental (L. Fuchs et al., 1997; Webb & Farivar, 1994) as well as correlational (e.g., Nattiv, 1995) research had demonstrated that increased use of elaborated help, as demonstrated in the PALS-HG condition, is associated with enhanced learning for primary- and intermediate-level students. Our findings in reading, by contrast, reveal a more complicated picture.

Among the older (fourth-grade) students, results correspond to previous work in mathematics: Students in the help-giving condition, who demonstrated higher levels of elaborated helping, also improved more in reading comprehension performance than their intermediate-level counterparts who did not receive preparation in elaborated help giving. The effect size comparing the PALS and PALS-HG groups was an impressive .72.

This effect may have accrued in two possible ways. One possibility is that the intermediate students may have benefited from opportunities to provide elaborated help. This possibility not only parallels empirical work in mathematics, which shows that elaborated helping benefits the providers of that help, but also is consistent with a generative model of learning (Wittrock, 1989), which posits that students extend their own understanding and competence if they elaborate on that understanding. Our version of elaborated helping required tutors to remind and help partners to use strategic reading behaviors; facilitating use of these strategies among peers may have promoted reading comprehension performance among the providers of the elaborated help.

In addition, however, it is also possible that the recipients of elaborated help in this study may have benefited from practicing the use of strategic reading behavior. Although this possibility seems plausible, research in mathematics is inconsistent about whether elaborated help benefits students who receive that help (Peterson & Janicki, 1979; Peterson, Janicki, & Swing, 1981; Webb & Kenderski, 1984). Moreover, because all students in this study served both tutoring roles, we cannot determine whether effects accrued specifically during the provision or the reception of elaborated help. Additional reading research in which students operate without role reciprocity is required to sort out these possibilities.

Although findings supported enhanced learning among fourth graders as a function of preparation for and use of elaborated help giving, results diverged for primary students. These younger children learned

more in the simpler PALS condition, where they not only engaged entirely in nonelaborated helping but also corrected fewer errors. The effect size favoring the PALS over the PALS-HG group was a sizable 1.05. What might explain these findings for the younger students, which stand in stark contrast to previous related work in mathematics?

In exploring these results, it seems sensible to return briefly to the student helping data, which revealed that the younger students did not take optimal advantage of the elaborated helping strategies. Rather, the primary-grade participants in the PALS-HG treatment corrected only 60% of errors (vs. 86% for the fourth graders in PALS-HG), and when making corrections they incorporated elaborated help only 39% of the time (vs. 97% for intermediate grade in PALS-HG). Consequently, the elaborated help-giving treatment, although similarly powerful in increasing helping behavior across grades, still netted lower levels of elaborated help giving among the primary-level children than among their intermediate-level counterparts. As already discussed, the older students appeared more capable of routinely integrating the elaborated helping methods into their everyday PALS use: Second and third graders may not have been developmentally ready to master or incorporate use of the relatively complex helping strategies their teachers presented.

Although these possibilities offer insight into why the younger students relied less on elaborated help, such speculation fails to explain why the younger students learned more in the simpler PALS condition, where students corrected fewer errors and engaged in less elaborated help than their trained counterparts. One possible explanation for this finding is derived from developmental reading theory, which provides a basis for arguing that the nonelaborated PALS corrections methods may have been more appropriate for the primary students.

Developmental models of reading (e.g., Chall, 1983; LaBerge & Samuels, 1974; Perfetti & Lesgold, 1979) assume that reading entails component skills, each of which is sufficient for a time, but then new skills must be learned for reading competence to increase. These components begin with letter-sound recognition and proceed sequentially to decoding, fluency, comprehension, and the ability to integrate and synthesize material (see Potter & Wamre, 1990). The nonelaborated PALS correction procedures largely encouraged tutors to provide answers; the nonelaborated PALS point structure, accordingly, encouraged students to proceed efficiently through text. These features may have supported more sustained reading and practice of comprehension strategies, with fewer interruptions than did the elaborated helping. In fact, these increased practice opportunities and a quicker pace may have been more appropriate for students for whom the major challenge is to acquire basic reading fluency and accuracy and who operate primarily on narrative text structures that require relatively simple comprehension strategies (Englert & Hiebert, 1984; Wilson & Rupley, 1997). By providing more intense oral reading, summarization, and prediction practice with fewer interruptions, the nonelaborated PALS correction methods may have been more supportive of younger students' development than was the PALS-HG treatment. The PALS-HG correction procedures emphasized and the point structure encouraged tutors' facilitation and tutees' formulation of strategies for constructing correct responses. Support for this proposition is found in the work of van den Broek, Risden, and Trabasso (1997), who documented that ninth graders remembered more of texts when they were interrupted during reading with questions. By contrast, for third graders, posing questions during reading interfered with comprehension and memory. Of course, it is important to emphasize that our study confounded the elaborated-helping training with the modified point structure,

thereby increasing the complexity of findings. The contrasting point structures awarded points for different behaviors. Moreover, in nonelaborated PALS students awarded their own points, whereas teachers awarded points in PALS-HG.

Before closing, it is interesting to note that our reading achievement results held regardless of whether students were at risk, average achieving, or high achieving. This finding corroborates previous investigations of PALS efficacy in reading (D. Fuchs et al., 1997; Simmons et al., 1994). In considering PALS for use in classrooms that incorporate diverse sets of learners, teachers should find it reassuring that peer-assisted learning activities can benefit a range of students. Nevertheless, a word of caution is in order. Although the pattern of findings held across the three types of learners (see Table 5), the amount of growth was relatively small for high achievers. We attribute these smaller amounts of growth to our use of the Stanford Diagnostic Test, which samples relatively easy items for use primarily with lower-achieving students. This reading comprehension measure exerted a ceiling effect for some of the high achievers, and it may have failed to provide sufficient opportunities for the high achievers to demonstrate the types of learning they accomplished.

Results should provide researchers and teachers alike with useful information as they consider directions for extending the knowledge base and identify methods for use in classrooms. Future research should replicate and explore findings. For intermediate-age students, examinations of how elaborated helping operates to enhance reading comprehension performance among the providers and recipients of elaborated help giving is important. Research with primary-grade students might productively focus on why nonelaborated help appears to extend students' reading competence. In addition, future research should incorporate a better variety of instruments, including reading comprehension and reading accuracy and fluency measures, and might attempt to separate the effects of elaborated helping and point structures.

Finally, as researchers replicate and extend the knowledge base, teachers might apply current findings to their classrooms in the following ways. First, it appears that primary students may benefit from group work that promotes intensive, uninterrupted practice on a variety of reading activities. By contrast, it appears that intermediate-age students should be taught elaborated help-giving methods, which encourage these students to engage in thoughtful, overt strategic reading behavior. Such training might include the kinds of explicit instruction incorporated into this study.

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