

---

# Effects of Peer-Assisted Learning Strategies on High School Students with Serious Reading Problems

LYNN S. FUCHS, DOUGLAS FUCHS, AND SARAH KAZDAN

## ABSTRACT

This study examined the effects of peer-assisted learning strategies (PALS) on students' literacy development and beliefs about reading, when PALS is implemented with secondary-level students in remedial and special education classes. Teachers were assigned to PALS ( $n = 9$  classes) and contrast ( $n = 9$  classes) treatments. Teachers implemented PALS with their entire classes five times every 2 weeks, for 16 weeks. To designate research participants for outcome measurement, teachers identified all students whose reading instructional levels were Grades 2 through 6. Reading comprehension and fluency were measured before and after treatment; beliefs were indexed after treatment. Analyses of variance indicated that, compared to contrast counterparts, PALS students grew more on reading comprehension and reported more positive beliefs about working hard to improve reading. However, PALS and contrast students grew comparably on reading fluency and reported similar beliefs about being and wanting to become better readers. Implications are discussed for developing effective forms of peer-mediated instruction for use in high school remedial and special education classes.

1989). Twenty-five percent of adults in the United States are functionally illiterate; they cannot read a note sent home from school or the information on a medicine bottle. For individuals with disabilities, figures are even more alarming, with estimates of illiteracy ranging as high as 73% (Riley, 1996).

These troubling statistics challenge educators to identify methods to promote students' reading development. One of several promising practices to emerge over the past two decades is classwide peer tutoring (e.g., Cooke, Heron, & Heward, 1983). As framed by Greenwood and colleagues (e.g., Greenwood, Delquadri, & Hall, 1989), *classwide peer tutoring* pairs higher- and lower-performing students in general education classrooms to work on structured reading activities: sustained reading by each partner, followed by the higher-performing student asking the lower-performing student who, what, where, when, and why questions. Research has demonstrated that classwide peer tutoring effects substantial reading improvements for elementary-age children. For example, Greenwood et al. (1989) showed that, among nondisabled, low-socioeconomic status, urban, at-risk children in Grades 1 through 4, classwide peer tutoring dramatically increased long-term reading achievement.

Due to its demonstrated success, classwide peer tutoring has been disseminated, and hybrid versions of the methods have been developed and tested. Fuchs and colleagues, for example, extended classwide peer tutoring to incorporate practice on strategic reading behaviors, including paragraph summarization and prediction activities. This hybrid form of classwide peer tutoring, known as peer-assisted learning strategies, or PALS, has been shown to enhance the reading

---

THE PROBLEMS ASSOCIATED WITH LIMITED READING competence are well documented. Compared to skilled high school readers, high school students with poor reading skills have lower self-esteem, pose greater discipline problems, and are less likely to complete school (Juel, 1996). For adults, reading deficits are associated with unemployment, incarceration, lack of civic awareness and involvement, poor health maintenance, and poverty (U.S. Department of Labor,

development of low- and average-achieving students, as well as children formally diagnosed with learning disabilities, when PALS is implemented in elementary-level mainstream settings (D. Fuchs, L. S. Fuchs, Mathes, & Simmons, 1997).

Unfortunately, no studies of classwide peer tutoring, or its hybrid methods have been conducted to examine its efficacy in promoting reading achievement among students at the secondary level. This omission is serious because the reading problems of secondary-level students may be especially difficult to remediate. Compared to elementary-age children, secondary students with serious reading problems have a longer history of failure, which has proven to be intractable. Moreover, in response to this history of failure, these students frequently demonstrate low motivation and academic self-confidence (LeCompte, 1987; Phelan, Yu, & Davidson, 1994), which further complicate efforts at remediation.

In addition to the longer-standing, often more complicated problems of older students, high school settings also pose a serious logistic challenge to the use of peer-mediated instruction in reading. This is the case because high schools provide no natural curricular opportunities for reading instruction to occur. At the secondary level, although the curriculum demands reading competence, it no longer allocates attention to the development of basic reading skills and strategies. Consequently, high school students with reading problems typically receive reading instruction in separate classrooms. This makes classwide peer tutoring or PALS impossible to implement as designed—within mainstream classrooms that permit competent tutors to be paired with and serve as models for poor readers.

This is unfortunate because within other academic content areas where instructional opportunities naturally occur, the effectiveness of classwide peer tutoring has been demonstrated with secondary students. Specifically, in a series of two studies, Maheady, Sacca, and Harper (1987, 1988) showed that 9th- and 10th-grade students, enrolled in general education, inner-city high school classes, dramatically improved their weekly quiz scores in social studies and math.

The question nevertheless remains, Does peer-mediated instruction represent a promising strategy for enhancing the literacy development of secondary-level students, in the more *homogeneously* grouped classes available for reading instruction within high schools? Although direct evidence is currently not available to answer this question, two related sources of information offer insight to the answer. Unfortunately, these sources of information provide contradictory evidence.

On the one hand, Maheady et al. (1988) demonstrated positive effects on social studies quizzes when classwide peer tutoring was implemented by high school resource room students. In contrast, Mathes and Fuchs (1993) documented disappointing results in reading when PALS was conducted by elementary-level students with learning disabilities in resource rooms. One way to understand these discrepant findings is to attribute them to the content on which tutoring occurred. Low-achieving students may effectively tutor one another when the goal is rote memorization, as was the case

in the Maheady et al. study. However, for developing new strategic and procedural competence, as required by the reading curriculum addressed by Mathes and Fuchs, competent tutors may be necessary. Unfortunately, with only two available, relevant studies, these sources of contradictory information are impossible to resolve.

In sum, a pressing need exists to identify effective strategies to promote literacy among high school students with serious reading difficulties. One promising method is peer-mediated forms of reading instruction, which has demonstrated efficacy among elementary-level students. Nevertheless, no information exists by which to judge the utility of these methods for developing reading competence within homogeneously grouped secondary-level classes—the dominant setting in which high schools address reading problems. Consequently, the purpose of this study was to examine the effectiveness of peer-mediated instruction within high school remedial and special education reading classes. Our primary outcome was students' development of reading competence. In addition, we examined students' beliefs about reading, about how hard they worked to improve their reading competence, and about how hard they worked with classroom peers.

## METHOD

### Participants

**Teachers.** Participants were 18 special education and remedial reading high school teachers in 10 high schools within one metropolitan southeastern school district. To be eligible to participate, teachers had to include in their reading classes students with disabilities who experienced chronic reading difficulties. We assigned teachers to two treatments: PALS (nine teachers who implemented PALS, each with one class) and contrast (i.e., no peer-mediated reading activities; nine teachers, each with one control class). Inferential statistics indicated no relation between treatment and teachers' class size (in which PALS or control occurred), years teaching, gender, or highest degree earned (see Table 1).

**Students.** Teachers implemented their respective treatments with all students in their reading classes. To specify research participants for whom treatment effects would be assessed, however, each teacher identified the subset of students whose reading instructional levels were Grades 2 through 6 at the beginning of the study. We limited our research participants to students reading at grade levels 2 through 6 because (a) our resources did not permit individual pre- and posttesting of all students and (b) PALS previously has been validated for elementary students in Grades 2 through 6. Inferential statistics indicated no relation between treatment and students' grade, age, number of absences during the study, reading level (as judged by teachers), gender, free/reduced lunch status, race, type of reading class (i.e., resource vs. remedial), and disability status (see Table 1).

TABLE 1. Teacher and Student Demographics by Treatment

Variable	PALS				No PALS				F	$\chi^2$
	$\bar{X}$	SD	n	%	M	SD	n	%		
Teacher										
Class size	15.33	7.31			16.11	6.53			0.23	
Years teaching	12.28	7.26			17.50	9.02			1.83	
Female			7	78			6	67		0.28
Degree										
Bachelor's			1	11			2	22		0.41
Master's			7	78			6	67		
Doctoral			1	11			1	11		
Student										
Grade	9.67	1.00			9.88	1.06			1.02	
Age	15.73	1.29			15.90	1.23			0.46	
Absences	3.65	3.77			3.42	3.88			0.09	
Years retained	0.60	0.82			0.72	0.67			0.69	
Reading level	5.05	1.82			4.83	2.03			0.34	
Male			32	61			38	76		
Free lunch			26	59			20	40		1.03
Race										
African American			28	54			28	56		0.32
European American			22	42			21	42		
Asian American			2	4			1	2		
Class										
Resource			34	65			36	72		0.52
Remedial			18	35			14	28		
Disability										
LD			35	67			39	78		
MMR			2	4			2	4		
Other disability			1	2			1	2		
Remedial			14	27			8	16		

Note. PALS = Peer-Assisted Learning Strategies; LD = learning disabilities; MMR = mild mental retardation.

### Treatment

Contrast teachers provided reading instruction using their conventional programs, which incorporated no peer-mediated learning activities. PALS teachers supplemented their reading instruction with PALS five times every 2 weeks (i.e., 2.5 times per week) for 16 weeks. The total amount of reading instruction in the two treatments was, however, constant; it was limited to one class period per day. We present information about PALS in five segments: background information about and rationale for elementary-level (Grades 2–6) PALS, operationalization of the elementary-level PALS methods, commonalities and differences between elementary-level PALS and high-school PALS, teacher training, and fidelity of implementation.

**Background and Rationale.** Elementary-level PALS incorporates structured activities, with frequent verbal interaction and feedback between tutors and tutees and with reciprocity of tutoring roles (so that both students serve as tutor and tutee in each session). In PALS, we rely on structured

interactions because previous research (Fitz-Gibbon, 1977; Michaels & Bruce, 1991; Palincsar & Brown, 1989) indicates that open-ended discussions are often problematic, confused, and ineffective. We built into PALS frequent interaction and feedback, along with role reciprocity, because research documents 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 comprises 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 has 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 conscious judgments

in the selection and reduction of textual information (Palincsar & Brown, 1984); (b) to allocate attention to the major content and check whether 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 demonstrates 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., Baumann, 1984; 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 documents, 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 of Palincsar and Brown (1984), practice in formulating predictions was associated with improvements in reading comprehension.

PALS has been shown to be an effective reading treatment among students in Grades 2 through 6 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.

**Elementary-Level PALS Procedures.** Teachers conduct PALS with all students in their naturally constituted classes. Teachers begin by conducting an initial set of scripted training lessons, which they conduct during regular class periods. These 6 to 10 lessons (depending on how teachers divide the material) incorporate brief teacher presentations, student recitation of information and application of principles, and teacher feedback during student implementation. Each lesson lasts 30 to 60 minutes (see Fuchs, Fuchs, Mathes, & Simmons, 1995, for manual).

Following training, teachers incorporate three 35-minute PALS sessions each week into their existing allocated reading time. During PALS, all students in the class are paired; each pair includes a higher- and a lower-performing student. The teacher determines pairings by ranking the class in terms of the teacher's judgment of overall reading competence. After ranking students, the teacher does a median split and

then pairs the highest performer from the top half with the highest performer from the bottom half, and so on. Although tutoring roles are reciprocal, the higher-performing student reads 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 is literature the teacher has selected to represent the appropriate reading difficulty level.

Pairs are assigned to one of two teams for which they earn points. Points are awarded for completing reading activities correctly and demonstrating appropriate tutoring behavior. Each pair keeps track of points on a consecutively numbered score card, which represented joint effort and achievement. Each time a student earns a point, the tutor slashes the next number. In addition, as teachers lead PALS sessions, they circulate and award points (slash numbers) to reward cooperative behavior and correct tutoring methods. At the end of the week, each pair reports the last number slashed on the score card as the pair's total; the teacher sums each team's points; and the class applauds the winning team. Every 4 weeks, the teacher formulates new pair and team assignments. Thus, the motivational system combines competitive (team vs. team) and cooperative (combined effort of the pair) structures.

Every day, the first PALS activity is Partner Reading, designed to improve students' reading accuracy and fluency. Each student reads aloud connected text for 5 minutes, for a total of 10 minutes of sustained reading. The higher-performing student reads first; the lower-performing student rereads the same material. Whenever a word-reading error occurs, the tutor says, "Stop. You missed that word. Can you figure it out?" The reader either figures out the word within 4 seconds or the tutor says, "That word is \_\_\_\_\_. What word?" The reader says the word. Then the tutor says, "Good. Read the sentence again." Students earn 1 point for each correctly read sentence (if a word-reading correction is required, 1 point is awarded after the sentence is read correctly) and 10 points for the retell. After both students read, the lower-performing student retells for 2 minutes the sequence of what occurred in the text.

The second PALS activity, designed to develop comprehension through summarization and main idea identification, is Paragraph Shrinking. Continuing to read subsequent sections of text, students read orally one paragraph at a time, stopping to identify its main idea. Tutors guide the identification of the main idea by asking readers to identify (a) who or what the paragraph is mainly about and (b) the most important thing about the who or what. Readers are required to put these two pieces of information together in 10 or fewer words. When the tutor determines that a paragraph summary error occurs, he or she says, "That's not quite right. Skim the paragraph and try again." The reader skims the paragraph and tries to answer the missed question. The tutor decides whether to give points or give the answer. If the error involves more than the allotted 10 words, the tutor says, "Shrink it." (As with each PALS activity, tutors formulate their own responses

to questions in order to provide corrections; there are no answer keys.) For each summary, students earn 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 continue to monitor and correct reading errors, but points are no longer awarded on a sentence-by-sentence basis. After 5 minutes, the students switch roles.

The last activity, Prediction Relay, extends Paragraph Shrinking to larger chunks of text and requires students to formulate and (dis)confirm predictions. The activity comprises four steps: The reader makes a prediction about what will be learned on the next half page; reads the half page aloud while the tutor identifies and corrects reading errors; (dis)confirms the prediction; and summarizes the main idea of the half page. When the tutor judges that a prediction is not realistic, he or she says, "I don't agree. Think of a better prediction." Otherwise, the word-reading and paragraph summary correction procedures are used. Students earn 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 switch roles.

#### **Elementary-Level Versus High School-Level PALS.**

High school PALS 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. High school PALS did, however, deviate from elementary-level PALS in two important ways. First, in high school PALS, students changed partners frequently, rather than every 4 weeks. Second, the high school PALS reinforcement system was more structured and incorporated tangible reinforcers. Each day, both students in the highest-scoring dyad put their names on a "High-Scoring Pair" chart posted in the room. Then, they wrote their individual names on slips of paper and entered the slips into a PALS "Winners Circle." Once each month, the teacher drew one name from the Winners Circle; the winning student received \$10. Students who attended regularly and worked hard during PALS increased their probability of winning.

**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, 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 to 2 weeks for 5 to 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. RAs were

trained in a 1-hour session to conduct and score the observations, which listed each required PALS or PALS-Help Gurg element. In every classroom, an observer (who was not the RA assigned as consultant to that class) observed the teacher and three dyads—one dyad for each of the three PALS activities. 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. (Percentage of agreement =  $[\text{agreement between Rater A and B} / (\text{agreements between A and B} + \text{disagreements between A and B} + \text{omissions})] \times 100$ ; see Coulter, cited in Thompson, White, & Morgan, 1982.) The percentage of correctly implemented elements was 86.29 ( $SD = 13.08$ ).

#### **Measures**

**Literacy Development.** To assess literacy development, we used the Comprehensive Reading Assessment Battery (CRAB; L. S. Fuchs, Fuchs, & Hamlett, 1989). The CRAB employs four 400-word traditional folktales (readability of Grade 2.5) used in previous studies of reading comprehension (e.g., Brown & Smiley, 1977; Jenkins, Heliotis, Haynes, & Beck, 1986). The stories had been rewritten by Jenkins et al. to approximate a second- to third-grade readability level (Fry, 1968) while preserving the gist of the stories. These folktales serve as stimuli for CRAB tasks. On each of two passages, pupils read orally for 3 minutes and then answer 10 comprehension questions. Questions require short answers, reflecting recall of information contained in idea units of high thematic importance. Across pre- and posttesting, each student read from all four passages. Tasks associated with passages and orders of administration of the tasks were counterbalanced across treatments.

As the student reads aloud, the examiner marks insertions, omissions, mispronunciations, and substitutions; self-corrections are not considered errors. The score is the average number of correct words read across the two reading passages. (Note that because the student's performance is time limited at 3 minutes, we refer to this score, in this article, as a *measure of fluency*.) After the student reads a passage, the examiner asks questions and records responses. When the student makes five consecutively incorrect responses, testing is terminated. The score is the average number of questions answered correctly across the two passages. (We refer to the number of questions answered correctly as a *measure of comprehension*.)

For the number of words read correctly score, test-retest reliability ranged between .93 and .96 (L. S. Fuchs, Marston, & Deno, 1983), and concurrent validity with the Stanford Achievement Test—Reading Comprehension was .91 (L. S. Fuchs, Fuchs, & Maxwell, 1988). For the number of questions answered correctly score, test-retest reliability was .92,

and the correlation with the Stanford Achievement Test—Reading Comprehension was .82 (L. S. Fuchs et al., 1988). Scorers were trained to a criterion of 100% agreement prior to data collection.

**Student Beliefs.** We used a questionnaire to sample students' beliefs along three dimensions: attitude toward reading, working hard to become a better reader, and working with other students. The questionnaire presented students with a set of statements. For each statement, the student indicated the extent to which the statement was true for him or her, according to a 5-point Likert-type scale (1 = *not true*, coded as an empty circle; 2 = *a little true*, coded as a 25% blackened circle; 3 = *kind of true*, coded as a 50% blackened circle; 4 = *mostly true*, coded as a 75% blackened circle; 5 = *very true*, coded as a 100% blackened circle). An RA read aloud directions, which incorporated practice items. The RA assured students that answers could not be considered right or wrong and that responses would not be available to teachers, parents, or peers. The RA read each item aloud, and students marked their responses independently; students used markers to keep their places.

Three statements examined students' general attitudes toward reading: "I like to read"; "I am a good reader"; and "I want to become a better reader." Four statements assessed the extent to which students believed they had worked hard this year to become better readers: "In this class, I have worked hard to improve my reading skills"; "I have worked hard this year to become a better reader"; "I work hard in this class so I will make good grades"; and "My teacher has helped me to become a better reader." Finally, two statements examined students' attitudes about working with their peers: "I like helping other students"; and "I like working with other students on reading." On the questionnaire, statements addressing each of the three dimensions were dispersed, rather than clustered.

### Data Collection

The CRAB was administered individually, immediately before and after the 16-week treatment, by RAs who had been trained in standard test administration. Student questionnaires were administered in whole-class format immediately after treatment, by RAs who had been trained in standard test administration.

## RESULTS

On each of the CRAB pretreatment scores and on each of the CRAB growth scores (posttreatment minus pretreatment scores), we conducted a one-way (treatment: PALS vs. contrast) analysis of variance (ANOVA). In addition, we ran an analogous ANOVA on each questionnaire item. To calculate effect sizes (ESs) on final-status data (i.e., questionnaire data), we calculated the difference between means, divided by the pooled standard deviation (Hedges & Olkin, 1985). For out-

come data involving growth (i.e., CRAB data), we used the difference between the growths, divided by the quantity: pooled standard deviation of the growth/the square root of  $2(1-r_{xy})$  (Glass, McGaw, & Smith, 1981). Effect size can be interpreted in the same way as z-scores—that is, difference between means, standardized in terms of standard deviation units. According to convention, a small ES is less than or equal to .25; a medium ES is .25 through .50; and a large ES is greater than .50.

### Literacy

ANOVAs revealed that the pretreatment performance of the two treatment groups was comparable (see Table 2). ANOVAs indicated that, on the number of words read correctly, students in the two treatment groups grew comparable amounts (ES = .04). By contrast, on number of questions answered correctly, the growth of PALS students exceeded that of contrast students (ES = .34). (Differences on final status were not significant for either measure.)

### Student Beliefs

**Reading in General.** Results indicated no significant difference between PALS and contrast students in terms of their general attitudes toward reading (see Table 3). For "I like to read," the ES was a negligible .02. For "I am a good reader" and "I want to become a better reader," ESs were larger, but modest (.27 and .31).

**Working Hard to Become a Better Reader.** With respect to student beliefs about the extent to which they had worked hard to become better readers, differences on each of the four questionnaire items were statistically significant (see Table 3). In addition, ESs were large: for "In this class, I have worked hard to improve my reading skills," .69; for "I have

TABLE 2. CRAB Scores by Treatment and Time

Score/time	PALS		No PALS		F
	M	SD	M	SD	
Words read					
Pre	357.14	76.23	351.32	78.34	0.14
Post	378.48	85.79	369.61	80.50	0.29
Growth	21.34	36.44	18.29	45.06	0.14
Questions answered					
Pre	5.88	2.56	6.10	2.49	0.20
Post	7.22	2.23	6.64	2.44	1.57
Growth	1.35	1.64	0.54	1.73	5.84*

Note. CRAB = Comprehensive Reading Assessment Battery; PALS = Peer-Assisted Learning Strategies.

\* $p < .05$ .

TABLE 3. Student Responses to Questionnaire by Treatment

Dimension/question	PALS		No PALS		F
	M	SD	M	SD	
Reading in general					
I like to read.	2.72	1.28	2.70	1.29	0.01
I am a good reader.	3.72	1.23	3.38	1.29	1.64
I want to become a better reader.	4.25	1.28	3.85	1.27	2.08
Working hard to become a better reader					
In this class, I have worked hard to improve my reading skills.	4.25	0.99	3.53	1.13	1.79*
I have worked hard this year to become a better reader.	4.14	1.25	3.30	1.29	9.13*
I work hard in this class so I will make good grades.	4.57	0.85	4.05	1.05	6.16**
My teacher has helped me to become a better reader.	4.18	1.17	3.18	1.41	12.78***
Working with peers					
I like helping other students.	3.61	1.22	2.93	1.21	6.72**
I like working with other students on reading.	3.89	1.39	3.30	1.49	3.50†

Note. PALS = Peer-Assisted Learning Strategies. Students responded on a 5-point Likert scale (1 = not true; 2 = a little true; 3 = kind of true; 4 = mostly true; 5 = very true).

\* $p < .01$ ; \*\* $p < .05$ ; \*\*\* $p < .001$ ; † $p = .065$ .

worked hard this year to become a better reader,” .67; for “I work hard in this class so I will make good grades, .55; and for “My teacher has helped me to become a better reader,” .78.

**Working with Peers.** PALS students agreed with the statement “I like helping other students” statistically significantly more than did contrast students (see Table 3;  $ES = .41$ ). For the remaining statement, “I like working with other students on reading,” the difference between PALS and contrast students was marginally significant (see Table 3;  $p = .065$ ), with an  $ES$  of .31.

## DISCUSSION

In this study, we examined whether PALS, which was designed for elementary-age students in general education classrooms, can promote literacy development for adolescents served in remedial and special education high school classes. We also examined how PALS affects student beliefs about reading in general, how hard they work to improve their reading, and how hard they work with peers. We limited our focus to secondary-level students who read at second- to sixth-grade levels because elementary-level PALS previously had been validated at these grades.

Findings are mixed. Some evidence suggests that PALS shows promise for promoting literacy among these seriously delayed high school students; other results reveal limitations. Below, we first interpret findings related to students’ literacy development, and then explore PALS effects on students’ beliefs. Finally, we discuss the other lessons we learned incidentally, as a function of working with peer-mediated reading instruction in these secondary classes.

### Students’ Literacy Development

Students in the PALS treatment group improved their reading comprehension scores statistically significantly more than did students in contrast classrooms. Although producing only a moderate effect size of .34 standard deviations and despite comparable posttreatment status, this finding of better reading growth among PALS students is nevertheless important. The overall goal of reading instruction is to enhance comprehension, and results indicate that, compared to conventional reading instruction, PALS effected better growth on this critical outcome among a group of students whose reading problems have proved to be intractable. Given PALS’s strong emphasis on strategic reading behavior, wherein students are provided frequent practice in retelling, summarizing, and predicting on-line as they read, the finding that PALS enhanced secondary-level students’ text comprehension makes sense. It also supports and extends previous work demonstrating the effectiveness of related strategy instruction with elementary-level (e.g., D. Fuchs et al., 1997) and junior high (e.g., Palincsar & Brown, 1984) students.

Despite these promising findings, participants’ reading fluency, as measured on the CRAB words read correctly score, failed to improve differentially as a function of PALS participation. This stands in stark contrast to previous work examining PALS effectiveness with elementary-level students, where effects on students’ fluency scores have been statistically significant and sizable (e.g., D. Fuchs et al., 1997). Of course, although seriously delayed in reading, the participants in this study did demonstrate some basic reading competence, with pretreatment fluency rates averaging approximately 350 words per 3 minutes (or 117 words per minute). Consequently, on the one hand, a primary problem these

students manifested appears to reside with comprehension, and PALS did address that deficit. On the other hand, the elementary-level students among whom PALS fluency effects have been demonstrated to include students who read at comparable rates; so the failure to effect differential fluency growth remains unexplained.

In light of the moderate effect sizes for comprehension along with the disappointing findings for fluency, results raise questions about the overall effectiveness of peer-mediated reading activities within homogeneously grouped secondary-level reading classes. It is possible that to further promote reading competence, high school PALS must dedicate more than 10 minutes per session to sustained reading activities. It is also possible that high school PALS might need to incorporate greater incentives to read and might need to increase student access to interesting, age-appropriate reading materials (we return to this point later). Finally, because competent readers are not available in these remedial reading classes, peer assistance for correcting word-reading errors and peer models of fluent reading performance may have been inadequately instructive (cf. Mathes & Fuchs, 1993). Clearly, it is critical to identify methods to strengthen high school PALS so that it effects improvements in reading fluency. Given the strong relation between fluency and comprehension (e.g., Deno, Mirkin, & Chiang, 1982; L. S. Fuchs et al., 1988), strengthening adolescents' fluency, so that it resembles more closely the performance levels expected of typical secondary-level students, may serve to further boost PALS effects on reading comprehension, pushing effect sizes into the more substantial range.

Additionally, for adolescents considered nonreaders, who were not included in this study, PALS may need to incorporate an explicit focus on the development of decoding skills. At the primary grades, we have found such a focus to be necessary; thus, we have developed first-grade PALS, which explicitly and primarily promotes phonological awareness and decoding skills (Mathes, Howard, Allen, & Fuchs, 1998). Additional research may be necessary to identify age-appropriate peer-mediated strategies that promote basic decoding competence for secondary-level nonreaders.

### **Student Beliefs**

In addition to promoting reading comprehension, PALS appeared to affect student beliefs about their work habits in reading class. First, as compared with contrast group counterparts, PALS students reported working harder with their peers, with moderate effect sizes of .31 to .41. Given that PALS relies entirely on peer mediation, this is not surprising. What is more noteworthy is that, compared to the contrast students, PALS participants reported working harder during the study year to improve their reading performance. Effects were not only statistically significant, but also practically sizable, with effect sizes ranging between .55 and .69.

Interestingly, in comparison to control peers, PALS students also reported that their teachers worked harder, with an

effect size of .78. In light of the fact that PALS is conducted in a peer-tutoring format, where the teacher's role is monitor rather than instructor, this finding is surprising. It raises questions about the nature of reading instruction in the control classrooms. Unfortunately, we did not collect data to describe non-PALS instruction within the contrast (or in PALS classes); thus, we cannot comment on this issue in any objective, quantifiable way. Nevertheless, as reported by research assistants, via their informal anecdotes based on weekly classroom visits, reading instruction within many of these contrast secondary-level remedial and special education classes, as well as PALS classes—outside PALS sessions, was of questionable quality. These anecdotes await objective measurement. They are, nevertheless, disturbing, and they serve to strengthen the rationale that additional research is needed to describe and improve current remedial reading practices in high school settings. In addition, these anecdotes provide a basis for continuing to develop and explore the utility of peer-mediated practices to supplement teacher-led instructional activities in high school reading classes.

With respect to students' overall beliefs about reading, findings were disappointing. Concerning the extent to which they agreed with the statement "I like to read," differences between PALS and contrast students were virtually nonexistent. And, although effect sizes for "I am a good reader" and "I want to become a better reader" were moderate, differences failed to achieve statistical significance. Of course, given the longstanding reading difficulties of these secondary-level students, general attributional beliefs and attitudes have been shaped by multiple experiences over a long period of time. Consequently, as demonstrated by attempts to enhance elementary-age students' academically related motivation (e.g., Corno, 1992; L.S. Fuchs et al., 1997), it may be difficult to effect changes in these beliefs via a 16-week treatment.

### **Other Lessons Learned**

Readers might find it instructive to understand other lessons we learned incidentally, as we conducted peer-mediated reading activities in these secondary-level special and remedial education settings. We briefly alluded to these points earlier, when discussing PALS failure to effect reading fluency growth. These lessons concern the fact that, when working with older students whose reading problems have proven intractable over many years, motivation proves to be a key issue. Although PALS was initially novel and enjoyed a brief honeymoon period with these students, peer mediation was not enough to sustain the interest of some students. Instead, structured reinforcement systems, which incorporate tangible reinforcers, seem important.

Consequently, as we further investigate the potential of a revised high school PALS, we have extended the PALS motivational system in the following ways. First, we have modified the sports theme woven throughout elementary-level PALS (e.g., coaches and players, PALS points, winning teams) to incorporate a more adult, work theme (workers, PALS



dollars, employee of the month). Second, we have extended and strengthened the methods by which students earn tangibles: Students deposit their daily PALS dollar earnings into checking accounts; they maintain these accounts; and they write checks to order items from a PALS catalog (which includes, for example, donated CDs, local sports-team apparel, and fast-food coupons). The hope is that these students will remain motivated to learn and that they will incidentally develop math skills as well as work and spending behaviors that will serve them constructively as they exit school and face the demands of the adult world.

In a related way, a second motivation problem we faced in implementing PALS within high school settings was the minimal availability of suitable reading text. High school PALS participants, who read three to nine levels below their actual grade placement, required high-interest, low-vocabulary materials. And one of the greatest demands on teachers implementing PALS, even at the elementary level, where appropriate books are more readily available, is the continuous need to locate and make available interesting reading material. Unfortunately, in some of our high school PALS classrooms, students had limited access to suitable reading material; this required students to reread appropriate material and to read material that was inappropriately difficult or uninteresting. Due to this serious problem, we have located appropriate material and anthologized these readings thematically to provide high school remedial reading classes with suitable, interesting material. As practitioners and fellow researchers attempt to implement peer-mediated forms of reading instruction in high school settings, they need to be prepared to address this logistic problem.

### Conclusions and Practical Implications

Results of this study suggest the promise of PALS as one important means for addressing the serious reading problems that many adolescents still demonstrate. Findings indicate that among high school students reading at grade levels 2 through 6, PALS enhances reading comprehension growth more than does conventional high school programming and that, as a function of PALS, these students report working harder to improve their reading performance. At the same time, effects were not uniformly positive. PALS students did not demonstrate differential growth on reading fluency; moreover, their overall beliefs about liking and wanting to improve in reading were not affected by their PALS participation.

Consequently, this study provides the basis for additional work to explore how to extend and strengthen PALS for implementation in high school remedial reading and special education classes. Future work should examine methods for improving the fluency of these students and for extending the methods to address the subgroup of high school nonreaders. In addition, future work should focus on how to improve the motivation of these students to learn and how to overcome the related, logistical problem associated with providing these students with interesting, age-appropriate material to read.

As the field continues to adapt and extend PALS for adolescents, practitioners must address the challenges associated with enhancing the reading performance of this population. Our findings suggest that PALS can be used productively within high school remedial and special education classes. When adopting PALS for adolescents with long histories of reading failure, teachers should incorporate strong motivational systems and make available a wealth of interesting reading material. ■

---

**LYNN S. FUCHS**, PhD, is professor of Special Education and co-director of the John F. Kennedy Center's Institute on Learning Accommodations at Peabody College of Vanderbilt University. Her research focuses on teachers' use of instructionally relevant assessment practices and students' collaborative work to enhance student achievement. **DOUGLAS FUCHS**, PhD, is professor of Special Education and co-director of the John F. Kennedy Center's Institute on Learning Accommodations at Peabody College of Vanderbilt University. His research examines methods for expanding teacher capacity to accommodate student diversity and improving students' reading outcomes. **SARAH KAZDAN**, MS, is a doctoral student in the Department of Special Education at Peabody College of Vanderbilt University. Her interests focus on high school students with learning difficulties. Address: Lynn S. Fuchs, Box 328 Peabody, Vanderbilt University, Nashville, TN 37203.

### AUTHORS' NOTE

This research was supported in part by Grant No. H133G70050 from the U.S. Department of Education, The National Institute on Disability and Rehabilitation Research in the Office of Special Education and Rehabilitative Services, and Core Grant No. HD15052 from the National Institute of Child Health and Human Development to Vanderbilt University. Statements do not reflect the position or policy of these agencies, and no official endorsement by them should be inferred.

### REFERENCES

- Baumann, J. F. (1984). The effectiveness of a direct instruction paradigm for teaching main idea comprehension. *Reading Research Quarterly*, 16, 32-35.
- Bean, T. W., & Steenwyk, F. L. (1984). The effect of three forms of summarization instruction on sixth graders' summary writing and comprehension. *Journal of Reading Behavior*, 16, 297-307.
- Brown, A. L., & Day, J. D. (1983). Macrorules for summarizing texts: The development of expertise. *Journal of Verbal Learning and Verbal Behavior*, 10, 1-14.
- Brown, A. L., & Smiley, S. S. (1977). Rating the importance of structural units of prose passages: A problem of meta-cognitive development. *Child Development*, 48, 1-8.
- Collins, J., & Smith, E. E. (1982). Teaching the process of reading comprehension. In D. K. Detterman & R. J. Sternberg (Eds.), *How and how much can intelligence be increased?* (pp. 173-185). Norwood, NJ: Ablex.
- Cooke, N. L., Heron, T. E., & Heward, W. L. (1983). *Peer tutoring: Implementing classwide programs in the primary grades*. Columbus, OH: Special Press.
- Corno, L. (1992). Encouraging students to take responsibility for learning and performance. *Elementary School Journal*, 93, 69-83.
- Deno, S. L., Mirkin, P. K., & Chiang, B. (1982). Identifying valid measures of reading comprehension. *Exceptional Children*, 49, 36-45.
- Doctorow, M., Wittrock, M. C., & Marks, C. (1978). Generative processes in reading comprehension. *Journal of Educational Psychology*, 70, 109-118.

- Fitz-Gibbon, C. T. (1977). *An analysis of the literature of cross-age tutoring*. East Lansing, MI: National Center for Research on Teacher Learning. (ERIC Document Reproduction Service No. ED 148 807).
- Fry, E. (1968). A readability formula that saves time. *Journal of Reading*, 11, 513-516, 575-578.
- Fuchs, D., Fuchs, L. S., Mathes, P. G., & Simmons, D. C. (1995). *Peer-assisted learning strategies in reading: A manual*. Unpublished manuscript, Vanderbilt University, Nashville, TN.
- Fuchs, D., Fuchs, L. S., Mathes, P. G., & Simmons, D. C. (1997). Peer-assisted learning strategies: Making classrooms more responsive to diversity. *American Educational Research Journal*, 34, 174-206.
- Fuchs, L. S., Fuchs, D., & Hamlett, C. L. (1989). Monitoring reading growth using student recalls: Effects of two teacher feedback systems. *Journal of Educational Research*, 83, 103-111.
- Fuchs, L. S., Fuchs, D., Karns, K., Hamlett, C. L., Katzaroff, & Dutka, S. (1997). Effects of task-focused goals on low-achieving students with and without learning disabilities. *American Educational Research Journal*, 34, 513-543.
- Fuchs, L. S., Fuchs, D., & Maxwell, L. (1988). The validity of informal reading comprehension measures. *Remedial and Special Education*, 9(2), 20-29.
- Fuchs, L. S., Marston, D., & Deno, S. L. (1983). Improving the reliability of curriculum-based measures of academic skills for psychoeducational decision making. *Diagnostique*, 8, 135-149.
- Glass, G. V., McGaw, B., & Smith, M. L. (1981). *Meta-analysis in social research*. Beverly Hills, CA: Sage.
- Greenwood, C. R., Delquadri, J. C., & Hall, R. V. (1989). Longitudinal effects of classwide peer tutoring. *Journal of Educational Psychology*, 81, 371-383.
- Hedges, L. V., & Olkin, I. (1985). *Statistical methods for meta-analysis*. Orlando, FL: Academic Press.
- Jenkins, J. R., Heliotis, J., Haynes, M., & Beck, K. (1986). Does passive learning account for disabled readers' comprehension deficits in ordinary reading situations? *Learning Disability Quarterly*, 9, 69-75.
- Juel, C. (1996). What makes literacy tutoring effective? *Reading Research Quarterly*, 31, 268-289.
- Kohler, F. W., & Greenwood, C. R. (1990). Effects of collateral peer supportive behaviors within the classwide peer tutoring program. *Journal of Applied Behavior Analysis*, 23, 307-322.
- LeCompte, M. D. (1987). The cultural context of dropping out: Why remedial programs fail to solve the problems. *Education and Urban Society*, 4, 317-345.
- Maheady, L., Harper, G. F., & Sacca, M. K. (1988). Classwide peer tutoring programs in secondary self-contained program for the mildly handicapped. *Journal of Research and Development in Education*, 21(3), 76-83.
- Maheady, L., Sacca, M. K., & Harper, G. F. (1987). Classwide peer tutoring teams: Effects on the academic performance of secondary students. *The Journal of Special Education*, 21(3), 107-121.
- Markman, E. M. (1981). Comprehension monitoring. In W. P. Dickson (Ed.), *Children's oral communication skills* (pp. 61-84). New York: Academic Press.
- Mathes, P. M., & Fuchs, L. S. (1993). Peer-mediated reading instruction in special education resource rooms. *Learning Disabilities Research and Practice*, 8, 204-214.
- Mathes, P. M., Howard, J. K., Allen, S. H., & Fuchs, D. (1998). Peer-assisted learning strategies for first-grade readers: Responding to the needs of diversity. *Reading Research Quarterly*, 33, 62-94.
- Michaels, S., & Bruce, C. (1991). *Discourses on the seasons* (Tech. Rep.). Champaign: University of Illinois, Reading Research and Education Center.
- Palincsar, A. M., & Brown, A. L. (1984). Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities. *Cognition and Instruction*, 2, 117-175.
- Palincsar, A. M., & Brown, A. L. (1989). Classroom dialogues to promote self-regulated comprehension. In J. Brophy (Ed.), *Advances in research on teaching* (Vol. 1, pp. 35-71). New York: JAI.
- Paris, S. G., Cross, D. R., & Lipson, M. Y. (1984). Informed strategies for learning: A program to improve children's reading awareness and comprehension. *Journal of Educational Psychology*, 76, 1239-1252.
- Phelan, P., Yu, H. C., & Davidson, A. L. (1994). Navigating the psychological pressures of adolescence: The voices and experiences of high school youth. *American Educational Research Journal*, 31, 415-447.
- Riley, R. (1996). Improving the reading and writing skills of America's students. *Learning Disability Quarterly*, 19, 67-69.
- Rinehart, S. D., Stahl, S. A., & Erickson, L. G. (1986). Some effects of summarization training on reading and studying. *Reading Research Quarterly*, 21, 422-438.
- Simmons, D. C., Fuchs, D., Fuchs, L. S., Hodge, J. P., & Mathes, P. G. (1994). Importance of instructional complexity and role reciprocity to classwide peer tutoring. *Learning Disabilities Research and Practice*, 9, 203-212.
- Thompson, R. H., White, K. R., & Morgan, D. P. (1982). Teacher-student interaction patterns in classrooms with mainstreamed mildly handicapped students. *American Educational Research Journal*, 19, 220-236.
- Top, B. I. L., & Osguthorpe, R. T. (1987). Reverse-role tutoring: The effects of handicapped students tutoring regular class students. *Elementary School Journal*, 87, 413-423.
- U.S. Department of Labor. (1989). *Work Force 2000*. Washington, DC: U.S. Government Printing Office.
- Walberg, H. J. (1984). Improving the productivity of America's schools. *Educational Leadership*, 41(8), 19-27.
- Wiegmann, D. A., Dansereau, D. F., & Patterson, M. E. (1992). Cooperative learning: Effects of role playing and ability on performance. *Journal of Experimental Education*, 60, 109-116.

Received January 6, 1999  
 Initial acceptance February 24, 1999  
 Final acceptance March 17, 1999