Published in final edited form as:

Interv Sch Clin. 2010 September ; 46(1): 22–30. doi:10.1177/1053451210369516.

Embedding Number-Combinations Practice Within Word-Problem Tutoring

Sarah R. Powell, Lynn S. Fuchs, and Douglas Fuchs

Abstract

Two aspects of mathematics with which students with mathematics learning difficulty (MLD) often struggle are word problems and number-combination skills. This article describes a math program in which students receive instruction on using algebraic equations to represent the underlying problem structure for three word-problem types. Students also learn counting strategies for answering number combinations that they cannot retrieve from memory. Results from randomized-control trials indicated that embedding the counting strategies for number combinations produces superior word-problem and number-combination outcomes for students with MLD beyond tutoring programs that focus exclusively on number combinations or word problems.

Keywords

academic intervention; elementary curriculum; mathematics disabilities; instructional strategies for mild/moderate disabilities; mathematics instructions

Many elementary students struggle in one or more areas of mathematics (Geary, Hoard, & Hamson, 1999; Jordan, Hanich, & Kaplan, 2003). These students often are referred to as having a mathematics learning difficulty (MLD), which is operationalized as low mathematics performance. Whereas some of these students with MLD may have a school-

© Hammill Institute on Disabilities 2010

Corresponding Author: Sarah R. Powell, 228 Peabody, Vanderbilt University, Nashville, TN 37203 (sarah.r.powell@vanderbilt.edu).

Reprints and permission: <http://www.sagepub.com/journalsPermissions.nav>

Declaration of Conflicting Interests

The author(s) declared no conflicts of interest with respect to the authorship and/or publication of this article.

Statements do not reflect the position or policy of the funding agencies, and no official endorsement by them should be inferred.

diagnosed learning disability in the area of mathematics, others struggle with low mathematics achievement without diagnosis of a disability. To enhance the mathematical skills of students with MLD, remediation is necessary and often effective (Kroesbergen & VanLuit, 2003).

Solving word problems represents a deficit area for students with MLD. On simple word problems, students with MLD answer fewer correct than their typical peers (Hanich, Jordan, Kaplan, & Dick, 2001; Swanson & Beebe-Frankenberger, 2004). The same pattern holds true for complex word problems, with students with MLD performing significantly below peers (Fuchs & Fuchs, 2002). Word-problem solving is difficult because various steps and skills are necessary (Parmar, Cawley, & Frazita, 1996). Prior research has shown, however, that explicit small-group tutoring (e.g., Fuchs, Fuchs, et al., 2008) or individual tutoring (e.g., Fuchs et al., 2009) can improve the word-problem-solving skills of students with MLD.

An approach to word-problem solving that has produced favorable results over the past decade is schema-broadening instruction. With schema-broadening instruction, students are taught to recognize problems as belonging to problem types and then apply solution strategies that match those schemas (Fuchs, Fuchs, et al., 2008; Jitendra, Griffin, Deatline-Buchman, & Sczesniak, 2007). Schema-broadening instruction helps students understand unfamiliar problems as belonging within familiar categories so they can apply the solution strategies they learn to all problems within a given category. Three studies (Fuchs et al., 2009, 2010; Fuchs, Seethaler, et al., 2008) have validated a form of schema-broadening instruction for helping third-grade students with MLD solve word problems. In this “pirate-themed” program, students search for *X*—the word problem answer! The program teaches students three schemas (i.e., problem types): *Total*, *Difference*, and *Change*. For each problem type, students learn to (a) understand the schema (e.g., for Total problems there are two parts combined for a total), (b) represent the defining features of the schema with an algebraic equation (e.g., $2 + 3 = X$), and (c) solve the equation (e.g., $X = 5$). In all three studies, students participating in the program performed significantly better on tests of word problems than nonparticipating students.

Another mathematics area where students with MLD perform below typical peers is on number combinations (i.e., basic math facts). Across elementary grades, students with MLD perform significantly worse than typical peers on addition and subtraction number combinations (Andersson, 2008; Jordan & Hanich, 2003). Students with MLD also use counting strategies less efficiently than peers and make more calculation errors (Geary, Bow-Thomas, & Yao, 1992; Hanich et al., 2001). Number-combination knowledge can be enhanced through practice (e.g., Goldman, Pellegrino, & Mertz, 1988) or tutoring (e.g., Fuchs et al., 2009).

Several approaches to remediating number-combination deficits have been investigated. One approach is the use of computer-assisted drill and practice (e.g., Fuchs et al., 2006; Goldman et al., 1988). Results indicated that number-combinations knowledge of students increased with computer practice. Another approach involved teaching students counting strategies to solve number combinations (Tournaki, 2003), with results favoring counting strategies (e.g., the “counting on” or “*min* strategy”) over drill and practice. A third approach blended drill and practice with the teaching of counting strategies (Fuchs et al., 2009). In Fuchs et al. (2009), third-grade students learned counting strategies for solving addition and subtraction number combinations. Some of these students also practiced number combinations via computer-assisted instruction; others did not, restricting their practice to the use of counting strategies when solving word problems. Students who learned the counting strategies outperformed students not participating in the tutoring program on tests of number-

combinations fluency, regardless of whether they received the computerized drill-and-practice.

From this prior research, it appears that students with MLD benefit from explicit instruction on word problems as well as explicit instruction on counting strategies for solving number combinations. With this in mind, we combined these two instructional approaches into the pirate-themed math program. The program teaches word-problem solving with concurrent explicit instruction on counting strategies and daily practice with solving number combinations within the context of solving word problems (i.e., not computer-assisted drill-and-practice).

Word-Problem Tutoring

Employing a validated tutoring protocol that teaches students how to solve word problems (Fuchs et al., 2009), the program teaches students three word-problem types: *Total* (two amounts being combined), *Difference* (two amounts being compared), and *Change* (an amount increases or decreases). Instruction occurs individually within four units over 48 sessions, and sessions occur three times a week, 30 minutes per session.

See Table 1 for an outline of the program. In an introductory unit designed to equip students with basic skills needed to solve word problems, students are taught counting strategies for addition and subtraction problems. (The counting strategies are discussed in more detail in the next section.) Students are also taught to check word-problem work for accuracy, include a word label for answers, and solve for a variable (X) in addition and subtraction algebraic equations. After the introductory unit, students are taught how to set up and solve word problems in the Total, Difference, and Change units. (See Figure 1 for worked examples of Pirate Math word problems.) Students learn how to RUN through a problem regardless of problem type: *Read* the problem, *Underline* the question, and *Name* the problem type. After students name the problem type, they identify and circle important information in the word problem. Important information includes all numbers necessary to solve the problem and any words that describe what the question asks. Students also cross out information that is irrelevant to solving the problem. With the important information circled, students set up an algebraic equation that represents the problem type. Figure 2 provides examples of the structure of the algebraic equations for each problem type. Students mark the missing information (i.e., which becomes the word-problem answer) with an X in each problem type's algebraic equation. To solve the problem, students solve for X and write a word-problem label.

Warm-Up Flash Cards

During each session, five activities occur. The first activity is warm-up flash cards in which a student answers number-combinations flash cards for 1 minute. At the end of 1 minute, the tutor counts the number of correctly answered flash cards and encourages the student to "beat your score." The student then answers flash cards for another minute. The highest number of correctly answered flash cards during each tutoring session is graphed by the student.

Word-Problem Review

The next activity is a word-problem review in which the student looks at a word problem from the previous session's final review. The student talks aloud for approximately 30 seconds about the word-problem type and how to work through and solve the problem. Because instruction on word problems does not begin until the sixth session, word-problem review begins with the seventh session.

Tutor-Led Lesson

The third activity is the tutor-led lesson, which the tutor delivers guided by a script. The lesson is scripted to ensure that tutors cover material in a manner similar to how the program was validated. Tutors are encouraged to be familiar with the scripts but are not permitted to read or memorize them. These daily lessons are explicit, and the word-problem lessons (Lessons 6–48) rely on schema-broadening instruction (e.g., Fuchs et al., 2009). Lessons 6 through 15 focus on the Total problem type; Lessons 16 through 28 focus on Difference problems with review of Total problems; and Lessons 29 through 48 focus on Change problems with review of Total and Difference problem types. The instruction provided during the tutor-led lesson is scaffolded so students become independent word-problem solvers over the course of the tutoring program.

Figure 1 highlights examples of Total, Difference, and Change problems as solved by students using the program. The first example is a Total problem because two amounts (i.e., blue paper and green paper) are put together to make a total amount of paper. Notice how the student underlined the question, “How many pieces of blue paper did she have?” The student also circled the important numbers (i.e., 82 and 20) and provided labels (i.e., P1, P2, or T) for these numbers. The Total, or T, is 82, so the student wrote a *T* above 82. The first part, or P1, was missing, so the student wrote *P1* above the word *some*. The second part, or P2, was 20, so the student wrote *P2* above 20. The student also circled the word *pieces* to help her remember to use this word for an answer label. As for the algebraic equation, the student followed the Total equation of $P1 + P2 = T$ to produce as the equation of $X + 20 = 82$ for this Total problem. The missing part, P1, was marked with an *X*. To solve for *X*, the student rewrote the equation and subtracted to find the answer of “ $X = 62$ pieces were blue.” The second and third examples are Difference and Change problems, respectively.

Word-Problem Flash Cards

The fourth daily activity is word-problem flash cards. The tutor shows and reads word-problem flash cards, and the student names the problem type and places each card on a sorting mat with Total, Difference, Change, and ? boxes. During the Total unit, students sort cards into Total and ? boxes. After Difference problems are introduced, students sort cards into Total, Difference, and ? boxes. With the introduction of the third problem type, Change, students sort cards into Total, Difference, and Change boxes. Flash cards are presented for 2 minutes, then the tutor counts the number of correctly sorted cards and reviews up to five errors. Similar to the word-problem review, the student does not start working with word-problem flash cards until word problems are introduced during the sixth session.

Final Review

The fifth activity is final review, where the student works independently for up to 2 minutes to solve nine standard addition algebraic equations (e.g., $X + 4 = 9$; $3 + X = 10$; $2 + 7 = X$) and up to 2 minutes on solving one word problem. The tutor grades the review for accuracy, works with the student through any problems answered incorrectly, and keeps the review for use in the next session’s word-problem review.

Motivation

The theme for engaging students within the program is “pirates,” with students learning to solve for missing information in a word problem (i.e., *X*). The pirate theme is woven throughout each session as students are asked to be a pirate and “Find *X*!” For motivation, students have the opportunity to earn gold coins during each session. Gold coins are awarded to the student by the tutor for on-task behaviors such as listening well, working hard, and following directions. At the end of each session, students count their earned gold

coins and color that number of footsteps on a treasure map. When students color all the footsteps on a treasure map that lead to a giant *X*, they have the opportunity to choose a small prize from a treasure box.

Number-Combinations Practice: Counting Strategies

In the introductory unit, students receive instruction on counting strategies. See Figure 3 for counting-up posters. For addition facts, students are taught a *min* counting strategy: Put the bigger number in your head, count up the smaller number on your fingers, and your answer is the last number you say. Students learn that the order of the two addends in an addition problem does not matter. They should always start counting with the bigger number for efficiency. For example, to solve the number combination of $6 + 8$, the student points to his or her head and says, “8.” Then the student holds up one finger and says, “9,” holds up another finger and says, “10.” The student continues counting and holding up fingers, “11, 12, 13, 14.” The last number the student said was “14,” so $6 + 8$ is 14.

For subtraction facts, students are taught new vocabulary for the *minuend* and *subtrahend*. The minuend, or the number before the minus sign, was the “number you start with.” The subtrahend, or the number after the minus sign, was the “minus number.” After students learn this new vocabulary, they are taught the missing addend counting strategy: Put the minus number in your head, count up to the number you start with, and your answer is the number of fingers you have up. For example, to solve the number combination $13 - 9$, the student points to her or his head and says, “9.” The student then holds up one finger and says, “10,” then holds up another fingers and says, “11.” The student continues counting and holding up fingers, “12, 13.” At this point, the student is holding up four fingers, so the answer is “4.” We chose the min strategy for counting up addition number combinations and the missing addend strategy for subtraction number combinations because they are both efficient strategies that can be carried out with minimal counting knowledge and without any materials except fingers. Also, neither strategy requires students to count backwards, which is difficult for students with MLD (Baroody, 1984).

Additional number-combination practice occurs during the warm-up flash card activity and the tutor-led lesson. Each day during the warm-up flash card activity, students are given the opportunity to practice their counting strategies; the hope is that, with reliably correct practice, they will begin to commit number combinations to memory. During the flash card activity, the tutor shuffles a flash card deck of the 200 addition and subtraction number combinations. The student answers flash cards one at a time. If the student’s answer is correct, the tutor places the card in a correct pile. If the answer is incorrect, the tutor requires the student to use the appropriate counting strategy to find the correct answer. After the student counts and answers correctly, the card is added to the correct pile. As mentioned, flash cards are shown to the student for 1 minute; at the end, the tutor counts the number of flash cards in the correct pile. The student then has another minute to try to beat the initial score. At the end of the second minute, the tutor counts the number of flash cards answered correctly.

Another way the counting strategies are reinforced is at the beginning of each tutor-led lesson. Before the tutor begins the day’s word-problem instruction, the tutor asks the student how to use counting strategies to solve addition and subtraction number combination problems. The student verbalizes the three steps for counting addition problems and the three steps for counting subtraction problems. We believe it important that the student not rely on counting for every number combination because this inhibits the student from relying on automatic retrieval, a more efficient strategy than counting an answer. Therefore, after 6 days of counting practice, the tutor discusses with the student that the preferred

option for solving a number combination is to “know it.” Only if the student does not know the answer immediately should he or she employ the counting strategies. A “When You See a Math Fact” poster is introduced to help students memorize the “Know It or Count Up” phrase. Before the tutor moves on to the word-problem portion of the lesson, the tutor orally presents the student with four number combinations and asks the student to provide the answer from memory (Know It) or by solving it (Count Up). If the student answers incorrectly, the tutor and student count up the number combination together.

Added Value of Embedding Number-Combinations Practice

Two separate investigations were conducted to explore the benefit of including number-combinations practice within this word-problem math program. In the first investigation (Fuchs et al., 2009), word-problem intervention students were taught the counting strategies and utilized the number-combinations flash cards on a daily basis, but students did not recite and practice the counting strategies during the tutor-led lesson. Number-combinations intervention students were also taught the counting strategies and utilized the number-combinations flash cards on a daily basis, but the tutor-led lesson focused on practicing number combinations within fact families and provided computer-assisted drill-and-practice on number combinations.

After 15 weeks, the word-problem intervention students outperformed number-combinations intervention and control students on tests of word problems. On tests of number combinations, both word-problem intervention students and number-combinations intervention students outperformed control students. Whereas we expected students who used the word-problem program to perform better than the other two conditions on word problems, we did not expect them to perform as well as students in the number-combinations intervention on tests of number combinations. Finding comparable effects on number combinations for both active conditions indicated that equipping students with counting strategies and providing brief, but daily, practice via flash cards within word-problem tutoring is as effective as devoting an entire program (i.e., number-combinations intervention) to number combinations.

The second investigation (Fuchs et al., 2010) compared (a) the word-problem math program instruction, along with instruction on counting strategies at the beginning of the program but no daily counting strategies practice, to (b) the word-problem math program tutoring combined with counting strategies *and* daily practice in using counting strategies. Students in both conditions received instruction on counting strategies. Students without daily number-combinations practice read numbers from flash cards instead of answering number-combinations flash cards. These students also did not discuss and practice the counting strategies at the beginning of each tutor-led lesson. After 16 weeks of tutoring, students in the word-problem programs with and without counting-strategies number-combinations practice outperformed control students on tests of word problems. On tests of number combinations, students who used the math program along with number-combinations practice outperformed control students, and intervention students not receiving number-combinations practice also outperformed control students. Students using the math program along with number-combination practice outperformed students using the math program without practice. These results elaborated upon the results from the first investigation and indicated that daily counting-strategies number-combinations practice is better than an initial instructional session on counting strategies without daily practice.

In summary, for students with MLD, teaching counting strategies and practicing these strategies daily within the context of word-problem tutoring improves number-combinations

fluency. Also, word-problem instruction provided within schema-broadening instruction positively impacts word-problem performance of students with MLD.

Strategies for Teaching Word Problems and Number Combinations

Based on investigations using the math program described in this article, which includes the counting-strategies number-combinations component, the following suggestions and strategies are offered. In terms of word-problem solving, instruction should be explicit and be of long duration (i.e., at least 15 weeks) to give students time to learn and practice the word-problem strategies. Also, providing a framework (e.g., schema-broadening instruction) to structure students' understanding of the defining features of word problems improves the word-problem skill for students with MLD. Teaching students how to set up algebraic equations (e.g., $5 + X = 9$; $13 - 8 = X$) helps students make an abstract set of relations represented in a word-problem type more concrete.

In terms of counting strategies, students should be provided with explicit, step-by-step strategies for solving addition and subtraction number combinations. Along the same lines, however, students should be encouraged to use these strategies as a backup plan for when number combinations are not immediately known. Students need to practice counting strategies in a variety of formats (e.g., flash card practice, recitation of counting strategies, answering number combinations orally, paper-and-pencil reviews). Untimed practice (e.g., answering number combinations orally) allows students time to learn the counting strategies and practice them with corrective feedback from the tutor. Timed number-combinations practice (e.g., flash cards) forces students to begin committing number combinations to memory and helps students practice retrieving combinations from memory. Visual aids, such as posters, should be available for the students to refer to while learning the counting strategies, but these visual aids should be phased out so students do not learn to rely upon them.

Because most students with MLD perform below their peers on solving word problems and number combinations (Jordan et al., 2003), our word-problem tutoring, which embeds counting strategies instruction and practice in solving number combinations, accomplishes two important objectives, all in the context of one coordinated tutoring program. It combines the best of word-problem and number-combinations instruction for students who need practice in both skill areas, enabling teachers to remediate the two key deficits concurrently.

Acknowledgments

Funding

The author(s) disclosed receipt of the following financial support for the research and/or authorship of this article: This research was supported in part by Grant P01046261 from the National Institute of Child Health and Human Development (NICHD) to the University of Houston, with a subcontract to Vanderbilt University, and by and Core Grant #HD15052 from NICHD to Vanderbilt University.

Biographies

Sarah R. Powell, PhD, is a research associate in the Department of Special Education at Vanderbilt University. Her research interests include mathematics interventions for students with mathematics difficulty.

Lynn S. Fuchs, PhD, is the Nicholas Hobbs Professor of Special Education and Human Development in the Department of Special Education at Vanderbilt University. She also codirects the Vanderbilt Kennedy Center Reading Clinic. Her research interests center on classroom assessment and reading and mathematics intervention.

Douglas Fuchs, PhD, is the Nicholas Hobbs Professor of Special Education and Human Development in the Department of Special Education at Vanderbilt University. He also codirects the Vanderbilt Kennedy Center Reading Clinic. His research interests include learning disabilities identification as well as reading intervention.

References

- Andersson U. Mathematical competencies in children with different types of learning difficulties. *Journal of Educational Psychology*. 2008; 100:48–66.
- Baroody AJ. Children's difficulties in subtraction: Some causes and cures. *Arithmetic Teacher*. 1984; 34(3):14–19.
- Fuchs LS, Fuchs D. Mathematical problem-solving profiles of students with mathematics disabilities with and without comorbid reading disabilities. *Journal of Learning Disabilities*. 2002; 35:563–573. [PubMed: 15493253]
- Fuchs LS, Fuchs D, Craddock C, Hollenbeck KN, Hamlett CL, Schatschneider C. Effects of small-group tutoring with and without validated classroom instruction on at-risk students' math problem solving: Are two tiers of prevention better than one? *Journal of Educational Psychology*. 2008; 100:491–509. [PubMed: 19122881]
- Fuchs LS, Fuchs D, Hamlett CL, Powell SR, Capizzi AM, Seethaler PM. The effects of computer-assisted instruction on number combination skill in at-risk first graders. *Journal of Learning Disabilities*. 2006; 39:467–475. [PubMed: 17004677]
- Fuchs LS, Powell SR, Seethaler PM, Cirino PT, Fletcher JM, Fuchs D, Hamlett CL. The effects of strategic counting instruction, with and without deliberate practice, on number combination skill among students with mathematics difficulties. *Learning and Individual Differences*. 2010; 20:89–100. [PubMed: 20383313]
- Fuchs LS, Powell SR, Seethaler PM, Cirino PT, Fletcher JM, Fuchs D, Zumeta RO. Remediating number combination and word problem deficits among students with mathematics difficulties: A randomized control trial. *Journal of Educational Psychology*. 2009; 101:561–576. [PubMed: 19865600]
- Fuchs LS, Seethaler PS, Powell SR, Fuchs D, Hamlett CL, Fletcher JM. Effects of preventative tutoring on the mathematical problem solving of third-grade students with math and reading difficulties. *Exceptional Children*. 2008; 74:155–173. [PubMed: 20209074]
- Geary DC, Bow-Thomas C, Yao Y. Counting knowledge and skill in cognitive addition: A comparison of normal and mathematically disabled children. *Journal of Experimental Child Psychology*. 1992; 54:372–391. [PubMed: 1453139]
- Geary DC, Hoard MK, Hamson CO. Numerical and arithmetical cognition: Patterns of functions and deficits in children at risk for a mathematical disability. *Journal of Experimental Child Psychology*. 1999; 74:213–239. [PubMed: 10527555]
- Goldman SR, Pellegrino JW, Mertz DL. Extended practice of basic addition facts: Strategy chances in learning-disabled students. *Cognition and Instruction*. 1988; 5:223–265.
- Hanich LB, Jordan NC, Kaplan D, Dick J. Performance across different areas of mathematical cognition in children with learning disabilities. *Journal of Educational Psychology*. 2001; 93:615–626.
- Jitendra AK, Griffin CC, Deatline-Buchman A, Sczesniak E. Mathematical problem solving in third-grade classrooms. *Journal of Educational Research*. 2007; 100:283–302.
- Jordan NC, Hanich LB. Features of children with moderate mathematics deficiencies: A longitudinal perspective. *Learning Disabilities Research and Practice*. 2003; 18:213–221.
- Jordan NC, Hanich LB, Kaplan D. A longitudinal study of mathematical competencies in children with specific mathematics difficulties versus children with comorbid mathematics and reading difficulties. *Child Development*. 2003; 74:834–850. [PubMed: 12795393]
- Kroesbergen EH, VanLuit JEH. Mathematics interventions for children with special education needs: A meta-analysis. *Remedial and Special Education*. 2003; 24:97–114.
- Parmar RS, Cawley JF, Frazita RR. Word problem-solving by students with and without mild disabilities. *Exceptional Children*. 1996; 62:415–429.

- Swanson HL, Beebe-Frankenberger M. The relationship between working memory and mathematical problem solving in children at risk and not at risk for serious math difficulty. *Journal of Educational Psychology*. 2004; 96:471–491.
- Tournaki N. The differential effects of teaching addition through strategy instruction versus drill and practice to students with and without learning disabilities. *Journal of Learning Disabilities*. 2003; 36:449–458. [PubMed: 15497488]

Total

The art teacher had 82 pieces of colored paper. Some of the pieces of paper were blue, and 20 of the pieces were green. How many pieces of blue paper did she have?

$x + 20 = 82$
 $82 - 20 = x$
 $x = 62$ pieces were blue

Difference

At the picnic, the kids ate 65 hot dogs. They ate 32 hamburgers. How many more hot dogs did they eat than hamburgers?

$65 - 32 = x$
 $x = 33$ hamburgers

Change

Mr. Luther had 26 pencils in his desk. Then he gave 12 pencils to his students. How many pencils does Mr. Luther have now?

$26 - 12 = x$
 $x = 14$ pencils

Figure 1.
 Worked examples of word problems

<u>TOTAL</u>	<u>DIFFERENCE</u>
1. How many for <i>part 1?</i> (P1) <input style="width: 40px;" type="text"/>	1. What is the <i>bigger</i> number? (B) <input style="width: 40px;" type="text"/>
2. How many for <i>part 2?</i> (P2) <input style="width: 40px;" type="text"/>	2. What is the <i>smaller</i> number? (s) <input style="width: 40px;" type="text"/>
3. What is the <i>total?</i> (T) <input style="width: 40px;" type="text"/>	3. What is the <i>difference?</i> (D) <input style="width: 40px;" type="text"/>
4. Write the number sentence. <div style="display: flex; align-items: center; justify-content: center; gap: 10px;"> <input style="width: 30px;" type="text"/> <input style="width: 30px;" type="text"/> <input style="width: 30px;" type="text"/> <input style="width: 30px;" type="text"/> <input style="width: 30px;" type="text"/> </div> <div style="display: flex; align-items: center; justify-content: center; gap: 10px;"> P1 + P2 = T </div>	4. Write the number sentence. <div style="display: flex; align-items: center; justify-content: center; gap: 10px;"> <input style="width: 30px;" type="text"/> <input style="width: 30px;" type="text"/> <input style="width: 30px;" type="text"/> <input style="width: 30px;" type="text"/> <input style="width: 30px;" type="text"/> </div> <div style="display: flex; align-items: center; justify-content: center; gap: 10px;"> B - s = D </div>
5. Find X!	5. Find X!

<u>CHANGE</u>
1. How many do you <i>start</i> with? (St) <input style="width: 40px;" type="text"/>
2. How many do you <i>change?</i> (C) <input style="width: 40px;" type="text"/> Is there an <u>increase</u> ? + Is there a <u>decrease</u> ? -
3. How many do you <i>end</i> with? (E) <input style="width: 40px;" type="text"/>
4. Write the number sentence. <div style="display: flex; align-items: center; justify-content: center; gap: 10px;"> <input style="width: 30px;" type="text"/> <input style="width: 30px;" type="text"/> <input style="width: 30px;" type="text"/> <input style="width: 30px;" type="text"/> <input style="width: 30px;" type="text"/> </div> <div style="display: flex; align-items: center; justify-content: center; gap: 10px;"> St + or - C = E </div>
5. Find X!

Figure 2.
Total, Difference, and Change posters

Figure 3.
Counting Up posters

Table 1

Outline of Word-Problem Program

Session	Focus problem type	Focus of session
1		Addition and subtraction counting strategies
2		Double-digit addition
3		Double-digit subtraction
4		Checking word-problem work
5		Find X! addition
6	Total	Introduce $P1 + P2 = T$
7	Total	Irrelevant information
8	Total	$P1 + P2 + P3 = T$
9	Total	$P1 + X = T$
10	Total	$X + P2 = T$
11	Total	Word problems with money
12	Total	Double-digit word problems
13–15	Total	Information in charts, graphs, and pictures
16		Find X! subtraction
17	Difference	Introduce $B - s = D$
18	Difference	Irrelevant information
19	Difference	Word problems with money
20	Difference	$B - X = D$
21	Difference	$X - s = D$
22	Difference	Information in charts, graphs, and pictures
23	Difference	Double-digit word problems
24–28		Review
29	Change	Introduce $St +/ - C = E$
30	Change	Irrelevant information
31	Change	Word problems with money
32	Change	$St +/ - X = E$
33	Change	$X +/ - C = E$
34	Change	Information in charts, graphs, and pictures
35	Change	Double-digit word problems
36–38		Review
39		Solving multistep problems
40–48		Review