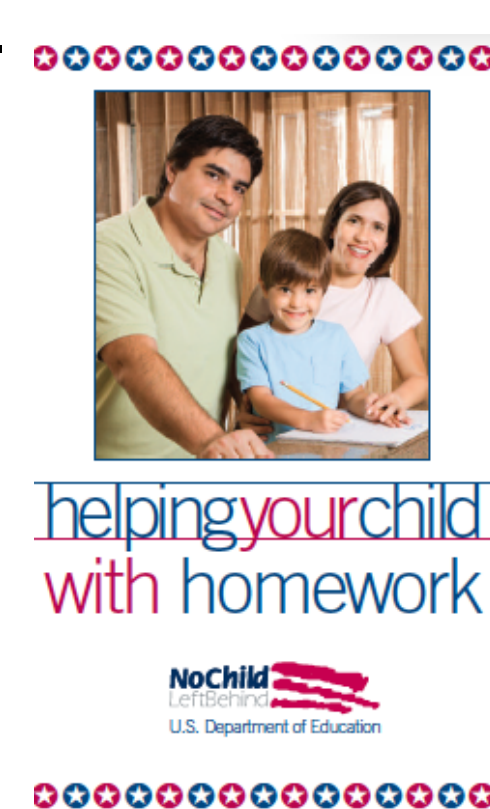


Background

- Prompting students to generate explanations as a means to make sense of new information (e.g., “self-explanation”; Chi, 2000) is a broadly endorsed learning activity.
- Explaining to other people** may be even more beneficial, especially for children. Four-year-olds who explained correct solutions to their moms had greater problem-solving transfer compared to those who explained to themselves (Rittle-Johnson et al., 2008).
- Homework** may provide a good opportunity for children to generate explanations.
 - Van Voorhis (2011) found that **family involvement** in homework increased student motivation and achievement.



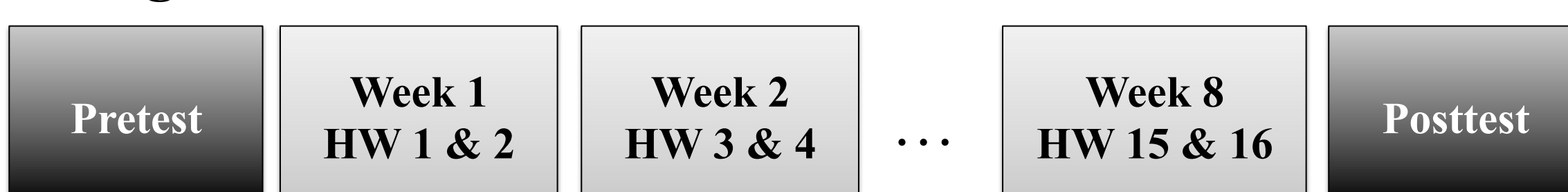
Goals

- Increase opportunities for children to make sense of problems and explain their mathematical thinking.
- Harness the benefits of both family involvement and explanation to improve word problem-solving accuracy.

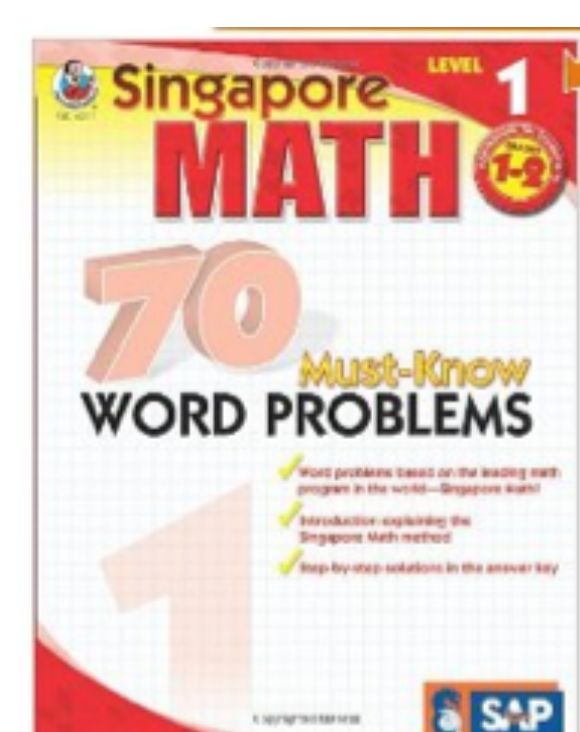
Method

Participants. 60 2nd graders from four classrooms at a metropolitan elementary school in middle Tennessee.

Design & Procedure



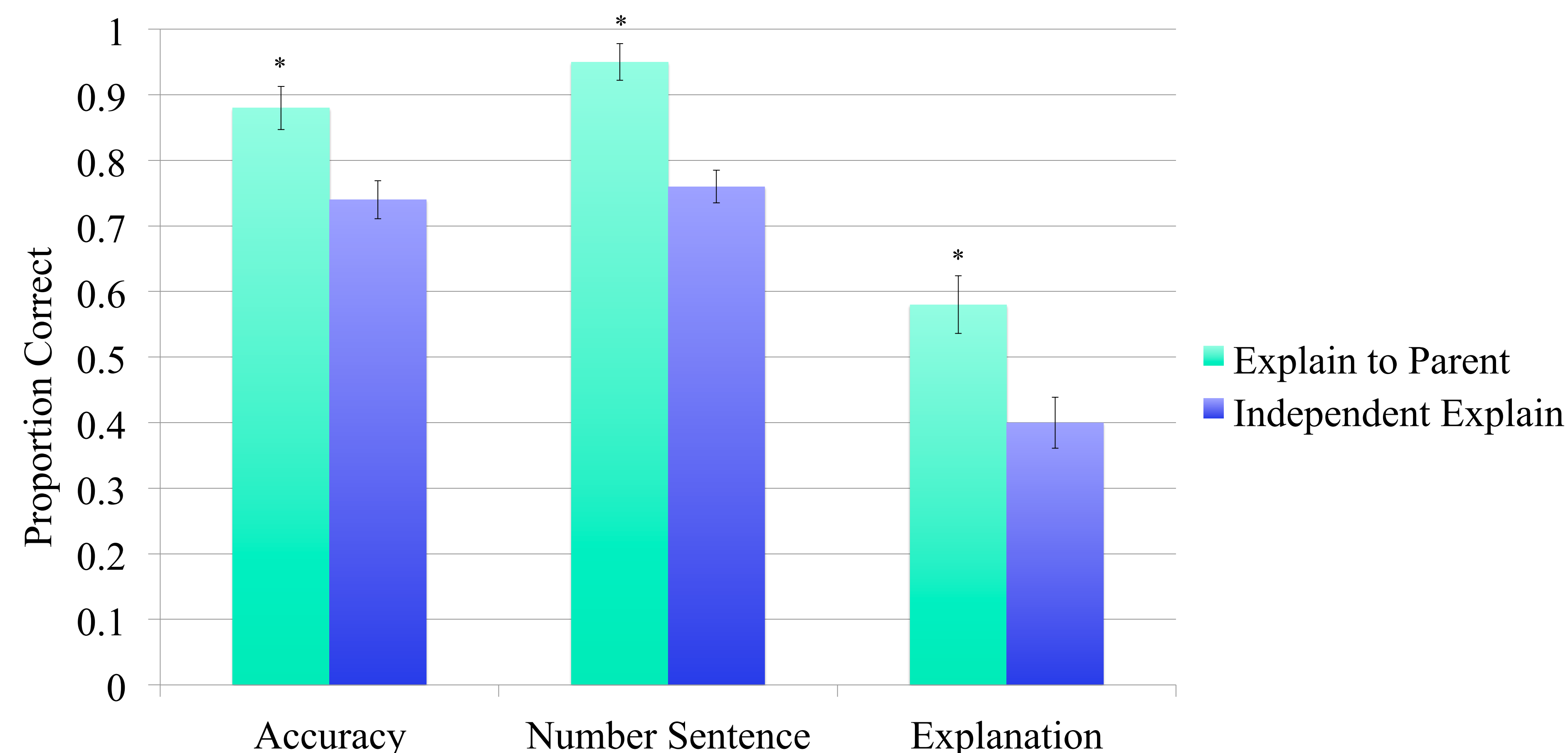
- 2 homeworks (HW) a week assigned for 8 weeks. Addition, subtraction and multiplication word problems from Singapore Math series.
- Explain to Parent condition**
Children independently solved problems and explained to their family partner.
- Independent explain condition**
Children independently solved problems and explained in writing.
- Teachers reviewed homework problems in class.



Assessment

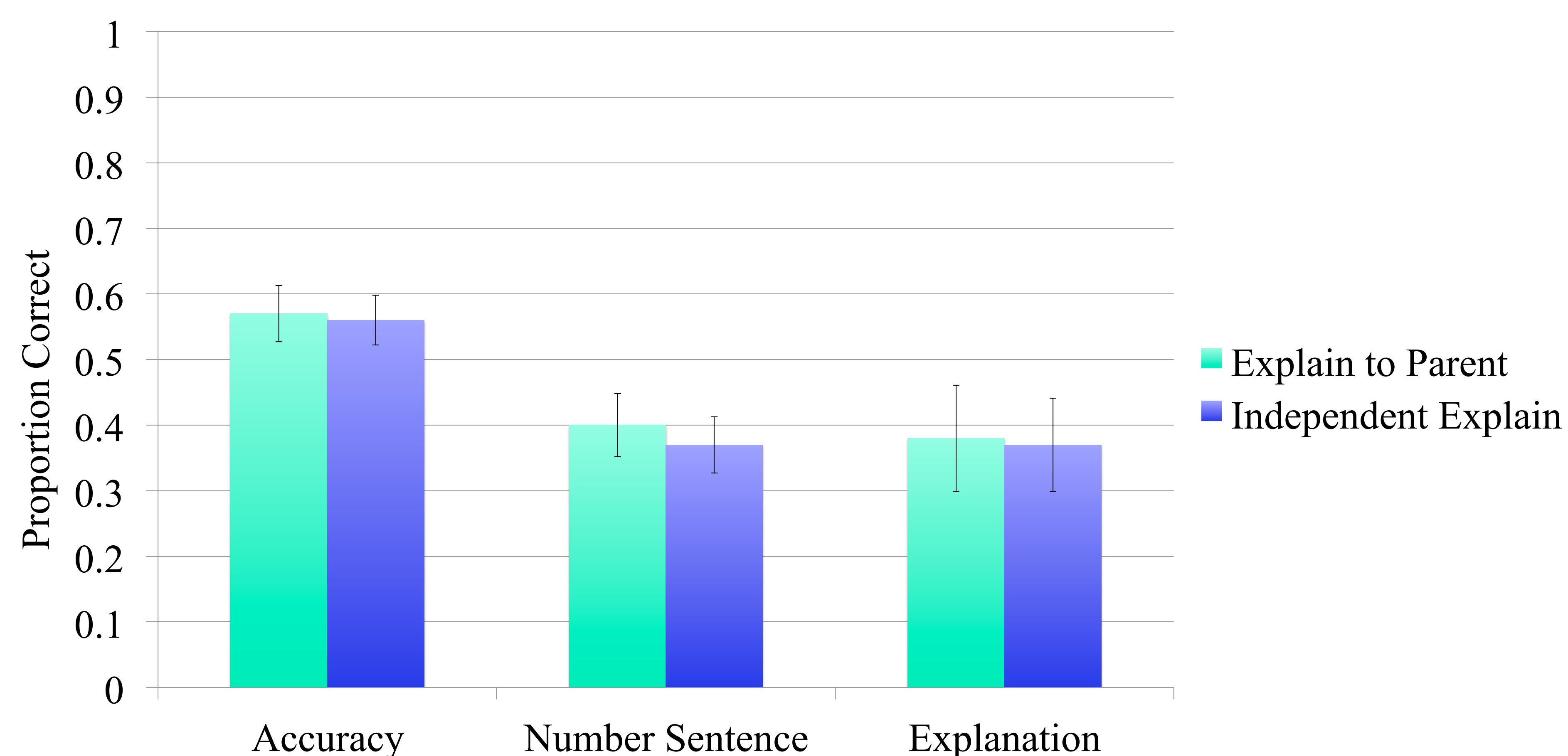
- Vanderbilt Story Problems 2 (Fuchs & Seethaler, 2008).
- Administered by teachers at pretest and posttest.
- Accuracy Coding: Children received 1 pt for providing the correct answer and 1 pt for providing the correct label. See sample HW (e.g., 15 points).
- Explanation Coding: Valid if student provided a correct explanation or procedure for a correct answer (1pt). See sample homework for a valid explanation.
- Number Sentence Coding: 1 pt for providing any correct number sentence for the word problem.
- At pretest, 2 conditions did not differ.

Performance on Homework



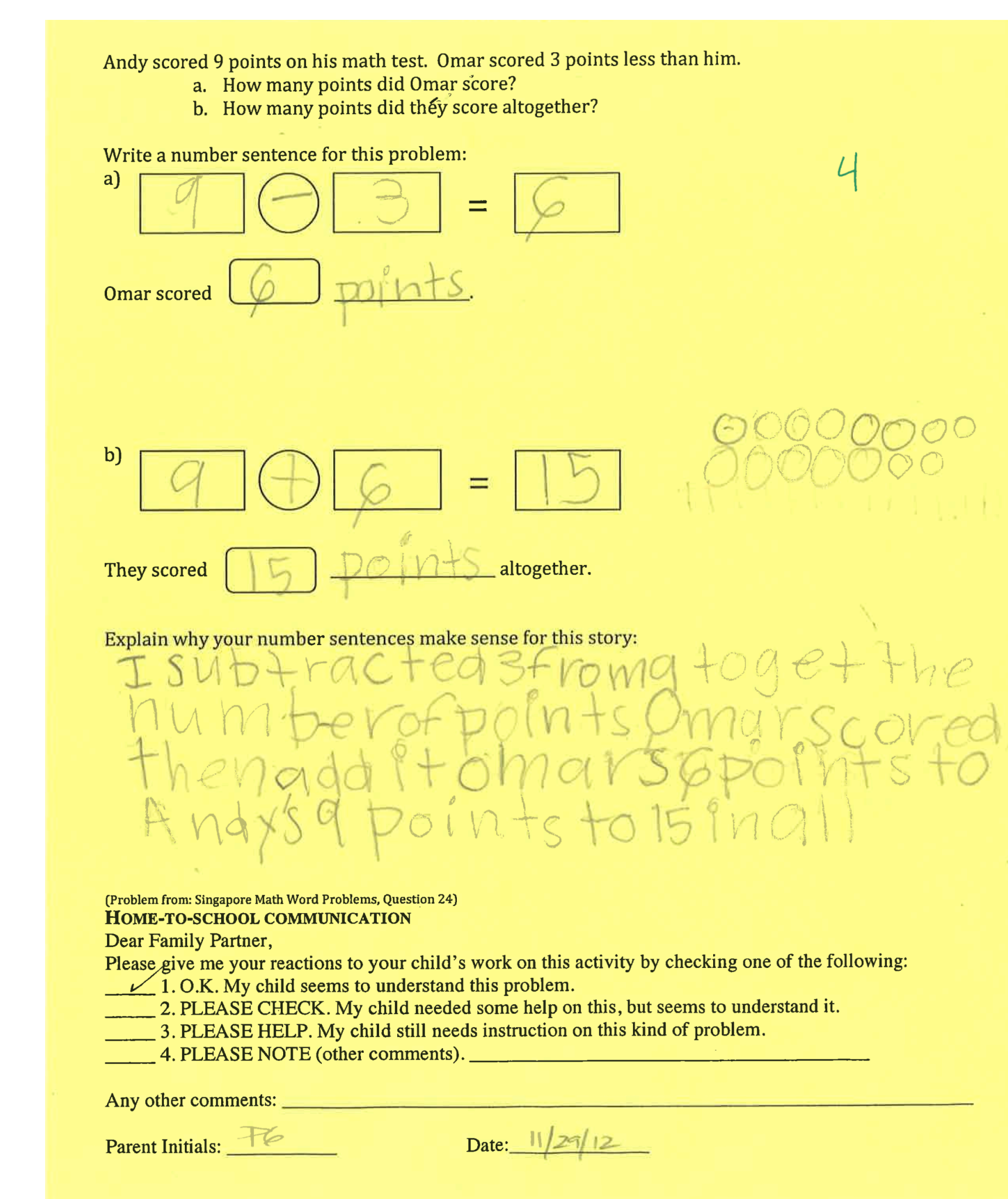
- Compared to children who independently explained homework problems, children who explained to their family partner:
 - had greater problem-solving accuracy on the homework assignments ($F = 9.66, p < .01$)
 - provided more valid explanations ($F = 8.51, p < .01$)
 - provided more correct number sentences ($F = 25.26, p < .01$)
- Controlling for pretest word problem-solving accuracy, homework accuracy ($r = .30, p = .03$) and explanation scores ($r = .24, p = .08$) were predictive of posttest word problem solving accuracy.

Posttest Results



- On the in-class posttest, no reliable difference in solution accuracy, nor in writing correct number sentences.
- Most children also struggled to provide a valid explanation when prompted on two posttest problems, with no reliable difference between conditions.
- However, students who explained to family partners were more likely to at least attempt to provide an explanation on the posttest (44% of children in independent explain did not attempt to explain vs. 24% in explain to parent), which is a step in the right direction.

Sample Homework



Summary

- Requested family involvement improved accuracy, explanation quality, and correct number sentences on homework, which were predictive of performance on an in-class posttest.
- However, requested family involvement did not reliably lead to better posttest performance, although it did increase attempts to provide an explanation.
 - In line with past research, family involvement seemed to impact student motivation to explain (VanVoorhis, 2011).
- While homework and family involvement had no effect on word problem-solving accuracy, teachers were still encouraged and enthusiastic about its utility as a learning tool.

Discussion

- Teachers considered the in-class review of the homework to be a particularly helpful learning activity. However, due to the large variability across classrooms on how this review was handled, we are limited in our ability to draw conclusions from the data.
- The homework assignments provided a desirable situation for children to persevere in solving problems and explain their mathematical thinking, helping teachers and students meet new Common Core State Standards.
- Future studies should further explore the role of explanation in weekly homework by specifically contrasting homework with and without prompts to explain.

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