

Research: Subtraction With Regrouping

Study 1 - Overview

The *Subtraction With Regrouping* lessons were field tested in a study involving a total of 23 students. Eleven students (i.e., five females and six males) participated in the *Subtraction With Regrouping* program. Of these 11 students, 3 had disabilities (i.e., one with autism, one with learning disabilities, and one with other health impairments). The remaining eight students were identified as students with math difficulties. The students were attending a summer remedial math camp and had just completed the third grade. A comparison group of 12 students (i.e., nine females and three males) received instruction from a basal mathematics program that involved regrouping instruction. These 12 students were identified as having math difficulties and had just completed third grade.

Results

The mean score for the treatment group on the regrouping computation pretest was 60%, and their mean score on the posttest was 86%. In contrast, the comparison group earned a mean score of 76% on the computation pretest and 78% on the posttest. A two-way mixed ANOVA with one repeated measure (pretest/posttest) and one between-subjects effect (treatment and comparison) revealed a significant difference between the pretest and posttest, $F(1, 16) = 5.56$, $p = .031$, and a difference between the groups that approached significance, $F(1, 16) = 3.92$, $p = .065$. Thus, both groups made computation gains, but the gain made by the treatment group was greater than that made by the comparison group, and the gain made by the treatment group was socially significant (i.e., students' mean scores when translated to grades improved from D to B), whereas the mean score of the comparison group remained at the C grade level.

Additionally, with regard to solving word problems, there was a statistically significant difference between the groups' scores, $F(1, 17) = 7.96$, $p = .012$, favoring the treatment group. The mean scores on the word-problem pretest and posttest earned by the treatment group were 45% and 77%, respectively. The mean scores on the word-problem pretest and posttest earned by the comparison group were 62% and 57%, respectively. The treatment group gain was socially significant when translated to grades (i.e., F to C), whereas the comparison group mean scores, when translated to grades, decreased from D to F.

Conclusions

The results suggest that the test scores of students with learning difficulties in mathematics improve with regard to solving both computation and word problems after participating in the *Subtraction With Regrouping* program. The gains for students who received instruction in the *Subtraction With Regrouping* program were greater than gains made by similar peers who received instruction using a traditional basal series.

Reference

Kaffar, B. J., & Miller, S. P. (2011). Investigating the effects of the RENAME Strategy for developing subtraction with regrouping competence among third-grade students with mathematics difficulties. Manuscript in preparation.

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Study 2 - Overview

In a multiple-probe across-participants study, five fifth graders with learning disabilities participated in the *Subtraction With Regrouping* lessons. There were four males and one female. The students took multiple and parallel forms of a test containing eight computation problems and two word problems across the duration of the study (i.e., baseline, treatment, maintenance [administered seven days after Instruction]).

Results

The mean baseline score for the participants was 10.95% with a range from 0% to 70.00%. The mean treatment score for the participants was 87.20% with a range from 30.00% to 100.00%. The mean maintenance score (i.e., 7 days after instruction ceased) was 86.00% with a range of 80.00% to 90%. All five participants increased their performance level only after the introduction of treatment. The percentage of non-overlapping data (PND) was 90.2%, representing a large effect size.

Conclusions

The results show that students with learning disabilities are able to acquire computation and word problem regrouping skills after participating in the lessons in the *Subtraction With Regrouping* program. They also are able to maintain these skills seven days after instruction ends.

Reference

Ferreira, D. (2009). Effects of explicit instruction on fifth-grade students with learning disabilities. Unpublished doctoral dissertation, University of Nevada Las Vegas, Nevada.