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How Do Homework Guides Help Students Acquire Procedural Knowledge?

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Publication Date: August 18, 2008

Abstract

The effects of using homework guides, and homework logs on students' abilities to solve word problems involving basic addition and subtraction facts were studied. Students received one of three versions of addition and subtraction timed tests once per week—every Thursday—that focused on measuring automaticity of basic addition and subtraction facts. Twenty second-grade students participated in this action-research study. Students' automaticity of basic addition and subtraction facts increased over the course of this study. Results indicated that homework guides positively affected student motivation to put forth more effort on homework. Additionally, word problems that involved basic subtraction facts appeared more difficult to solve; whereas, word problems that involved basic addition facts appeared easier to solve.

How Do Homework Guides Help Students Acquire Procedural Knowledge?

The purpose of this action-research study was to unearth specifics regarding the effects of homework and students' abilities to learn basic addition and basic subtraction facts. Homework has been researched in countless studies; nonetheless, current literature still leaves numerous unanswered questions regarding homework. The ongoing debate centers on homework's benefits, especially in an era where teacher/student accountability and student academic success is so important with the landscape created by the enactment of No Child Left Behind (2002). There is mounting evidence that homework has great effects on student learning.

Homework is an applicable and relevant topic for research because it teaches students many things, much unrelated to curricula. For example, students who consistently complete homework understand the importance of organization, time-management, and how to persevere through school, even if they do not "get it." Most educators would agree that these attributes help students to become better learners. Also, by having students record the days and amount of time they complete homework, students become self-directed learners, responsible for their own learning, and accountable to themselves. This is something that has become ever more important in the 21st century.

Studies on the benefits of homework in the early-elementary grades have been disparate; therefore, this line of research may merit closer attention and further study. How many rehearsals are needed to achieve fluency in solving addition and subtraction word problems? How do students feel about solving word problems at home? How do homework guides affect student effort in homework/procedural knowledge? These are questions that are addressed by educators and parent(s)/guardian(s) continually.

One aim of educators, parent(s)/guardian(s), and society is to educate and encourage students to be responsible, self-directed learners who persevere in their daily lives. If students are to become self-directed learners, it is essential they become self-aware. This includes being action participants in their own learning and exhibiting metacognition (or thinking about thinking). One strategy to foster this student growth is having students record, reflect, and set individual short-term goals. Teachers need to nourish the intrinsic motivation in their students by providing them with opportunities to practice skills such as goal setting that will eventually build up their own motivation, drive to learn, independence, responsibility, and commitment to learning throughout their lives.

The current education arena will benefit from additional research into the effects of homework, especially in the early-elementary grades. Assigning the correct amount of homework will help students retain and develop their understanding. That being said, homework is not a panacea for student learning, but rather a sharp tool that teachers must learn more about and use correctly in their instruction.

Literature Review

Homework

Homework has been the topic of countless research studies. The foci of these studies are predominantly on the time spent on homework and/or the debate on homework's appropriateness. This action-research study is grounded in the work of homework expert Dr. Harris M. Cooper. Cooper (2006) reports that "[l]ittle or no research has been conducted that examines the effects of homework on first or second grade [sic] students" (p. 11). This notion seems to merit action research on the topic of homework and its effects on students.

For the purpose of this study, homework is defined as any task assigned by schoolteachers intended for students to carry out during nonschool hours. This definition acknowledges that homework may be completed in school, in afterschool programs, and at home; but for most students, it will be completed in the home setting (Cooper, 2006, p. 1).

There are countless elements of homework that merit attention; however, in this study, two will be investigated/researched. These two pivotal elements are the frequency and length of homework.

Frequency is defined as how often homework is assigned. Based on Cooper's (1989) meta-analysis, the frequency of homework assignments for grades 1-3 should be one to three assignments per week. This means homework may be overassigned or underassigned, depending on its frequency.

In addition to frequency, the length of homework assignments is critical to its effectiveness. The time required to complete a homework assignment should be neither too long nor too short. National Council of Teachers of Mathematics (NCTM) recommends that "[g]rades 1-3 should have up to 20 minutes of homework a night" (Homework, p. 1). NCTM's recommendation holds to the informal rule many teachers use: 10 minutes multiplied by the student's grade level = the total amount of homework that is appropriate per night (e.g. 10 minutes multiplied by 2 = 20 minutes of homework that is appropriate for a second-grader per night). Assigning the appropriate amount of homework on a regular basis provides practice which is important in shaping students' understanding.

Research indicates that "[r]egular practice is a significant factor in the development of fluency. Teachers need to help students at all grade levels understand that skills can be automatic if they practice them" (Krudwig, 2003, p. 5). One of the roles of homework is to

offer extra opportunities for practicing a skill. Frequent, repeated practice helps students over-learn skills, which leads to automaticity.

Automaticity (hereinafter referred to as “fluency”) is defined in quantitative terms for this study as having a minimum correct rate for basic facts at 20-29 problems per minute. In this study, basic facts will be word problems involving addition and subtraction.

An example of basic fact fluency would be a second-grade student completing 20-29 out of 100 addition/subtraction problems correct per minute on a timed test. Fluency is crucial in homework because “[w]ithout the ability to retrieve facts directly or automatically, students are likely to experience a high cognitive load as they perform a range of complex tasks” (Woodward, 2006, p. 269). If this cognitive overload occurs, students are focusing too much attention on basic fact retrieval and not enough attention on figuring out what the word problem is asking. This is why students who complete less than 20-29 addition/subtraction problems correct per minute out of 100 on a timed test are *not* fluent.

Even more remarkable than little or no research being conducted that examines the effects of homework on first or second-grade students, fewer studies have been done on the topic of mathematical procedural knowledge. Procedural knowledge is defined as the knowledge of how to solve word problems that involve basic addition and subtraction facts.

Therefore, by combining homework and procedural knowledge, this research will gain insight into how homework guides help students acquire procedural knowledge. The broad question of this action research is, how do homework guides help students acquire procedural knowledge? This broad research question is narrowed into three sub-questions:

(1) How many rehearsals are needed to achieve fluency in solving word problems?, (2) How do students feel about solving word problems at home?, and (3) How do homework guides effect student effort in homework/procedural knowledge?

My action-research foci are: homework, fluency and rehearsals, and procedural knowledge and word problems. My suppositions are that: (1) Students will need large amounts of rehearsals in order to achieve fluency in solving word problems, (2) Students will generally feel positive towards solving word problems at home, and (3) Homework guides will increase student effort in homework/procedural knowledge.

Having declarative knowledge is important; however, procedural knowledge is important as well. Smilkstein (1993) asserts, "Without the related procedural knowledge, purely declarative knowledge will remain knowledge in words only and not knowledge in action or application" (p. 17). In education, teachers are often unaware of how to properly teach procedural knowledge. Star (2005) concludes, "We *have not* [italics added] devoted a great deal of attention in our research to procedural knowledge and its development" (p. 405).

Smilkstein (1993) suggests:

> Some ways we can help students acquire procedural knowledge is by guiding them as they go step-by-step through a process or through the application of a method. Students need repeated opportunities for independent authentic practice, that is, for doing the actual activities of the target method, process, or skill itself. After they have done this practice, we might give them a performance test so that we can see whether they have indeed acquired this procedural knowledge. (p. 17)

Authentic practice opportunities come in the form of fluent rehearsals. According to *Scholastic,* research suggests that "[i]f students constantly have to compute the answers to basic facts, less of that student's thinking capacity can be devoted to higher level concepts than a student who can effortlessly recall the answers to basic concepts" ("Math Fluency," p. 1). This means the ability to recall basic math facts fluently is necessary for students to attain or apply higher-order math skills.

The math curriculum in second-grade includes the following topics: whole numbers, fractions, addition and subtraction, multiplication and division, number patterns, sequences, number sentences, geometry, measurement, time, date and chance, and temperature. Students who do not know how to add and/or subtract fluently will struggle to solve math word problems. *Scholastic* states this in other words:

> Cognitive psychologists have discovered that humans have fixed limits on the attention and memory that can be used to solve problems. One way around these limits is to have certain components of a task become so routine and over-learned that they become automatic. ("Math Fluency," p. 1)

Establishing how many rehearsals students need to reach mathematical fluency is important. Teachers who know how many rehearsals are needed can adjust their teaching to make the best use of classroom time. Star (2005) criticizes, "Methods for assessing students' procedural knowledge are somewhat impoverished at present" (p. 410). Hopefully, this action-research study will improve my students' mathematical fluency and my assessment of procedural knowledge.

Stodolsky, Salk, and Glaessner (1991) claim, "In the elementary grades, math is one of the most liked subjects and is rated most important at all levels of schooling" (p.

91). Student surveys will illustrate students' feelings toward solving word problems at home. Knowing students' dispositions toward solving word problems at home is important. Students feeling negatively toward homework will most likely not want to do homework. Therefore, these students will not be getting the extra rehearsals needed to become mathematically fluent.

Procedural knowledge, or the knowledge of *how* to solve word problems that involve basic addition and subtraction facts, is quintessential in math. Since procedural knowledge does not reveal itself in a simple correct answer—just as Star (2000) contends: "[k]nowledge of procedures is measured by what a student does or does not do" (p. 85)—it is important to know *how* students are thinking and reasoning. While solving word problems, students must understand what they are doing and why they are doing it. Procedural knowledge transcends memorization and finds itself in true understanding. This true understanding is mathematical fluency.

Method

Participants and Setting

This study took place in a mid-sized but growing metropolitan city located in southeastern Minnesota. The school was a public elementary school which consisted of a student population of approximately 750 students, kindergarten through grade five. The school was unique in that it had two comprehensive educational programs: a neighborhood program and a public Montessori choice program.

The neighborhood program included approximately 527 students and 19 classroom teachers. The Montessori program served approximately 194 students and was supported by 7 classroom teachers. The school had approximately 60 other staff members who

supported students in a variety of ways. Twenty-four percent (24%) of the students were Limited English Proficiency (LEP), eight percent (8%) were Title I, and 17 percent (17%) were Special Education (which included students with an IEP). The school's demographics were as follows: (1) Six percent (6%) Asian, (2) 18 percent (18%) Hispanic, (3) 14 percent (14%) African American, and (4) 62 percent (62%) White. Thirty-three point seventy-two percent (33.72%) of the students received free lunch. Five point ninety-two percent (5.92%) of the students received reduced lunch.

The teacher, a participant observer in this study, was a 24-year-old, bilingual (Spanish and English), South Korean male. He was in his first year of teaching elementary school. He held a Bachelor of Science in Teaching Degree and was licensed to teach K-6 and 5-8 Mathematics in the state of Minnesota. The research he was conducting was for partial fulfillment of a Master of Science in Education Degree (M.S.Ed.) he was working on concurrently while teaching second-grade during the time of the study.

The school where this study took place was highly mobile. Mobility impeded the participant observer in carrying out a clean study. On the first day of school (September 4, 2007), the second-grade classroom was made up of 25 second-grade students. These students ranged in ages from 7 to 8 years of age. There were 12 boys and 13 girls. Four students in this classroom received English for Speakers of Other Languages (ESOL) instruction and four students received free/reduced lunch. Throughout the course of this 5-month study (September-January) there were a total of seven changes to his classroom roster. Only nineteen second-grade students remained from the first day of school.

Research Questions and Instruction

My action research was designed to answer three sub-questions. The first question was: "How many rehearsals are needed to achieve fluency in solving addition and subtraction word problems?" The second question was: "How do students feel about solving word problems at home?" The third question was: "How do homework guides affect student effort in homework/procedural knowledge?"

Data Collection Procedures

Table 1 shows my data triangulation matrix. I used the following data collection procedures to answer my three research questions (see Table 1). I used addition and subtraction timed tests to find how many rehearsals were necessary for students to become fluent in basic addition and subtraction facts. To be fluent in addition basic facts and subtraction basic facts, I expected students to answer 20-29 problems correct out of 100 in one minute. I decided 20-29 basic facts correct per minute was age and grade appropriate due to the fact Krudwig (2003, p. 6) determined "having a minimum correct rate for basic facts at 30-40 problems per minute" was fluent for middle school students.

Table 1

Data Triangulation Matrix

Research Question	Data Source #1	Data Source #2	Data Source #3
1.) How many rehearsals are needed to achieve automaticity (fluency) in solving addition and subtraction word problems?	Timed Tests	Homework Logs	Performance Assessment
2.) How do students feel about solving word problems at home?	Student Survey	Homework Logs	Parent Survey
3.) How do homework guides effect student effort in homework/procedural knowledge?	Student Survey	Homework Logs	

Addition and subtraction timed tests, each consisting of 100 basic facts were implemented late in the first quarter (late October) of the school year, for Unit 3: Place Value, Money and Time. A total of three different versions of timed tests (both addition and subtraction) were administered in this action research, the first being used (version 2) on November 19, 2007. These versions were variants of each other (version 1—the initial version used in this study—version 2, and version 3), which used identical addition and subtraction problems, however, in a different order. Different versions were implemented and alternated to ensure process validity. The participant observer sought to make certain that students were not merely memorizing questions and/or answers on the timed tests, but rather fluently answering addition and subtraction timed test problems.

Authentic assessment was used in this study. Students carried out performance assessments. Each student performed a think-aloud individually while answering a word problem that involved addition and/or subtraction. The participant observer used a 4-point rubric that consisted of 4 criterions to evaluate students' procedural knowledge. The criteria were as follows: (1) Explanation, (2) Checking, (3) Strategy/Procedures, and (4) Mathematical Errors. Authentic assessment, consisting of 6 word problems was used on a bi-monthly basis. Authentic assessment was used twice in the following three consecutive months: November, December, and January. Reliability was checked during December, when the initial of the twice-monthly authentic assessment was done by a parent-volunteer. Similarly, during January, the initial of the twice-monthly authentic assessment was done by a paraprofessional. The participant observer did this in order to avoid biases.

Homework logs, each consisting of the following 6 elements: (1) setting a weekly homework goal, (2) coloring the time and the days homework was completed, (3) feelings

while completing homework, (4) effort spent on the week's homework, (5) if you received help completing homework, and (6) do you like it when people help with your homework, supplemented timed tests and assisted in evaluating how many rehearsals were needed to become fluent. Homework logs (hereinafter referred to as "HL") went home with students weekly (on Monday). The following Tuesday, the HL was collected. The subsequent Monday, another HL was sent home. The amount of time spent on homework, as well as the specific days spent on math homework was recorded in HL. HL let parent(s)/guardian(s) express concern(s) and/or ask questions regarding their child's homework. Lastly, students recorded their attitudes towards their homework in their HL.

On October 29, 2007, the first HL was introduced and sent home with second-grade students. This HL was introduced and modeled in class and was to be returned by students on November 06, 2007. The participant observer modeled how to properly fill-out the HL. He modeled by using a transparency on an overhead projector. Since HL recorded students' attitudes towards their homework and allowed their parent(s)/guardian(s) to express concern(s) and/or ask questions regarding their child's homework, HL proved invaluable in terms of their data collection.

Beginning in the third week of November, (November 19, 2007), the participant observer introduced three addition problem solving strategies. Strategies included the following: counting on, combining groups, and adjusting and compensating. The participant observer modeled during regular math lesson time, always referring back to the strategies. He did this as part of the Everyday Mathematics Curriculum.

Surveys were used to determine/identify students' feelings about solving word problems at home, as well as how homework guides affected student effort in

homework/procedural knowledge. Two surveys were given to students and parent(s)/guardian(s). A pre survey established a baseline. Surveys were peer-reviewed by Winona State University Graduate Students. The student pre survey was given on September 28, 2007. There were a total of twenty-four student pre surveys that were taken and analyzed.

As of October 17, 2007, a little over two weeks after the initial mass sending of parent(s)/guardian(s) pre surveys (October 1, 2007), only thirteen surveys were returned. Due to the low response-rate, the participant observer created a reminder note that he sent home with the second-grade students on October 17, 2007.

A post survey measured changes in students' and parent(s)/guardian(s) attitudes about solving word problems at home, as well as how homework guides affected student effort in homework/procedural knowledge. On January 3, 2008, a post survey was sent to parent(s)/guardians. As of January, 25, 2008, three weeks after the initial mass sending of parent(s)/guardian(s) post surveys (January 3, 2008), fourteen surveys were returned. Due to the low response-rate, the teacher created a reminder note that he sent home with the second-grade students on January 28, 2008.

Results

Firstly, results indicated that thirteen rehearsals appeared to be optimal to achieve fluency in solving word problems that involved basic addition and subtraction facts. Secondly, students appeared to feel positive about solving word problems at home. Thirdly, homework guides positively affected student effort in homework/procedural knowledge.

The student post survey was given on January 4, 2008. There were a total of twenty-three student post surveys that were taken and analyzed. Student survey results indicated, overall, an increase in students who felt good about solving word problems at home. As well, greater number of students enjoyed working on homework.

When comparing the students' pre survey and post survey responses, I found that thirteen students answered *Always* to the question, "I enjoy solving math word problems." This was an increase of two from the pre survey. Fourteen students answered *Always* to the question, "I enjoy working on homework." This was the same result as in the pre survey; however, five students answered *Sometimes* to the question, "I enjoy working on homework." This was an increase of two from the pre survey.

The final results of the parent(s)/guardian(s) post surveys, with fifteen of twenty-three surveys returned, indicated that a majority of parent(s)/guardian(s) felt homework guides motivated their child to put forth more effort on his/her homework (a total of eleven of fifteen parent(s)/guardian(s) indicated yes).

When analyzing student scores on the authentic assessments, the students' six scores were totaled. Students were classified and fell into the following four groups: (1) Top five Students, (2) Upper-Middle five Students, (3) Lower-Middle five Students, and (4) Lowest five Students. Figures 1-4 illustrate the average addition basic facts correct per minute (ABFCPM) and subtraction basic facts correct per minute (SBFCPM) for the four aforementioned groups.

As one can see from the trend lines in Figures 1-4, word problems that involved subtraction basic facts tended to be more difficult for all students to solve and explain their answers than word problems that involved addition basic facts.

Figure 1

Top five Students (n=5)

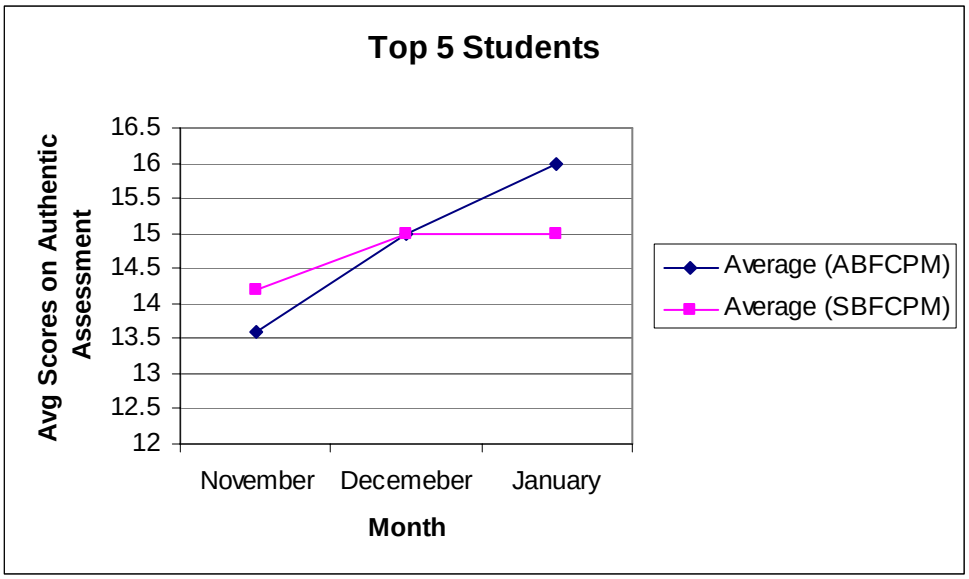
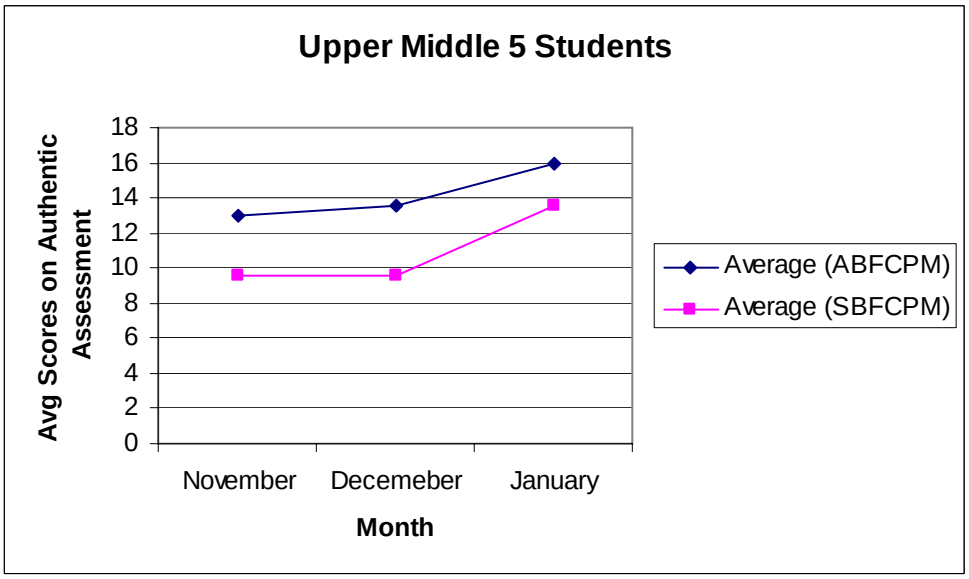


Figure 2

Upper-Middle five Students (n=5)



However, for the Top five Students and Upper-Middle five Students (see Fig. 1, Fig. 2), solving word problems that involved subtraction basic facts tended to improve or

stay static at a relatively high level when compared to the Lower-Middle five Students as well as the Lowest five Students (see Fig. 3, Fig. 4).

Figure 3

Lower-Middle five Students (n=5)

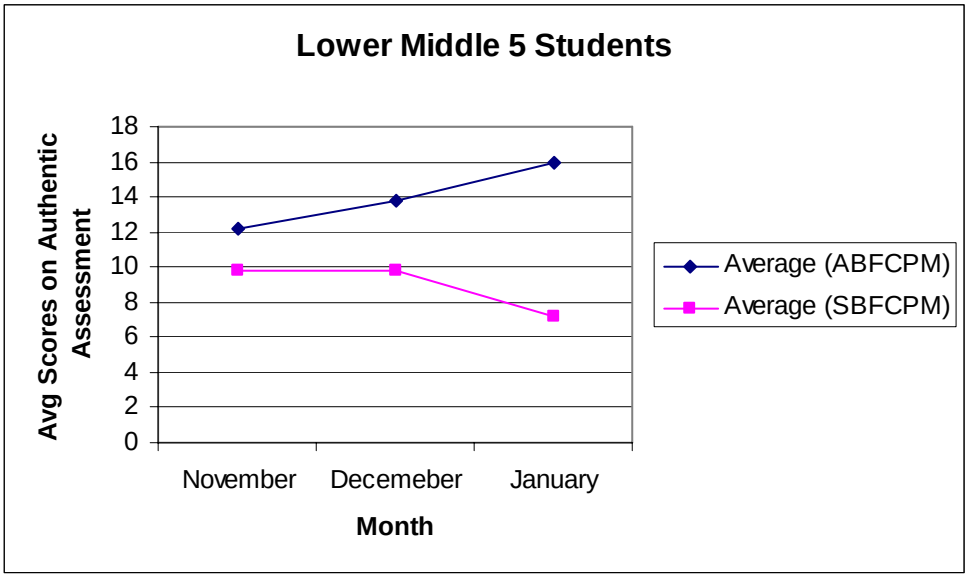
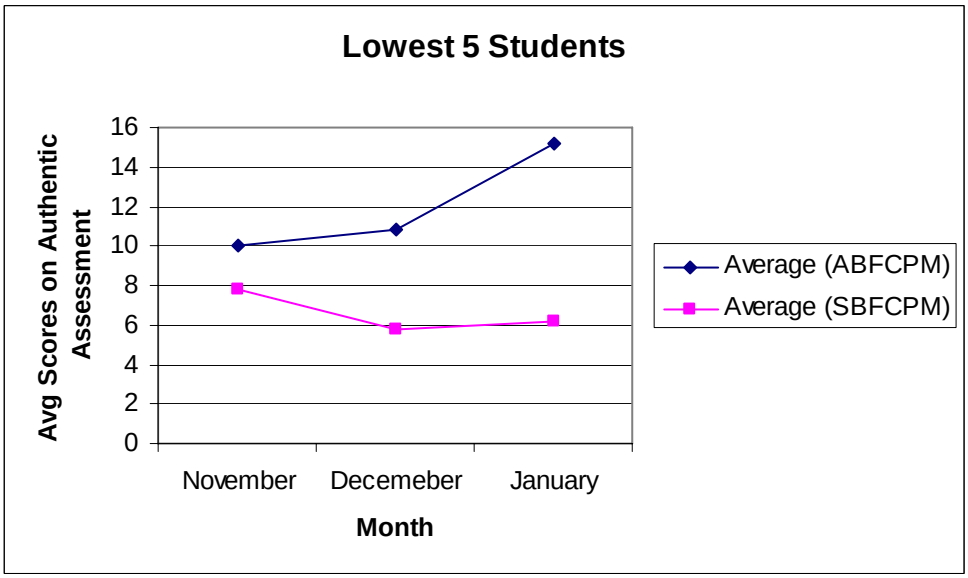


Figure 4

Lowest five Students (n=5)



These groups—the Lower-Middle five Students as well as the Lowest five Students—tended to have a much more difficult time solving word problems that involved subtraction basic facts.

My initial addition and subtraction timed tests were given on October 25, 2007. Results of these timed tests helped establish a classroom baseline (see Table 2). As of October 25, 2007, the classroom's average baseline score for the addition timed test was 8.76 ABFCPM. Given my definition of fluency, no students were fluent in addition basic facts as of October 25, 2007. As of October 25, 2007, the classroom's average baseline score for the subtraction timed test was 4.72 SBFCPM. Given my definition of fluency, no students were fluent in subtraction basic facts as of October 25, 2007.

Table 2 shows the results of the addition and subtraction timed tests. When analyzed, the results of the addition and subtraction timed tests were conclusive.

Table 2

Addition and Subtraction Timed Tests

	Class Average ABFCPM	**Number of Students Fluent (ABF)**	**Highest Score (ABFCPM)**	**Class Average SBFCPM**	**Number of Students Fluent (SBF)**	**Highest Score (SBFCPM)**
25-Oct-07	8.76	0	19	4.72	0	12
1-Nov-07	8.95	0	18	4.29	0	9
8-Nov-07	9.59	0	19	5.36	0	12
15-Nov-07	10.35	0	18	5.65	0	14
19-Nov-07	11.1	1	21	6.95	0	15
29-Nov-07	11.96	1	21	6.88	0	14
6-Dec-07	11.17	1	22	7.35	0	16
13-Dec-07	10.65	2	23	7.74	1	20
20-Dec-07	12	4	22	6.48	0	16
3-Jan-08	13	4	23	7.05	0	18
10-Jan-08	15.05	7	27	10.82	2	20
17-Jan-08	15.14	7	29	9.1	1	20
24-Jan-08	18.68	10	41	11.32	3	28

After close examination, the results of timed tests seemed to indicate there was a strong link between the number of repetitions and fluency. As repetitions increased, fluency increased.

Results of the first HL provided a baseline for this action-research study. The results indicated that the students who returned their HL (seventeen of twenty-two students), averaged doing 12.34 minutes of homework a day per week Monday-Monday, and doing 12.91 minutes of homework a day per school week Monday-Friday. Furthermore, baseline results indicate that a majority of children receive help with their homework (thirteen of seventeen students; 76%) and that a majority of children like it when people help them with their homework (fourteen of seventeen students; 82%). Lastly, effort appeared to be high when students completed their homework (extremely hard eight of seventeen students; 46% and pretty hard three of seventeen students; 18%).

The fifth HL, which was introduced on January 7, 2008, and collected on January 15, 2008, provided great insight when compared to the first HL for this action-research study. The fifth HL results indicated that the students who returned their HL (fourteen of twenty-two), averaged doing 14.15 minutes of homework a day (per week; Monday-Monday) and doing 13.73 minutes of homework a day (per school week; Monday-Friday). Furthermore, results indicate that a majority of children receive help with their homework (thirteen of fourteen students; 92.86%) and that a majority of children like it when people help them with their homework (twelve of fourteen students; 85.71%). Lastly, effort appeared to be high when students completed their homework (extremely hard six of fourteen students; 42.86% and average five of fourteen students; 35.71%).

Results of the authentic assessment show that the majority of children had a difficult time solving word problems that involved subtraction. This is similar to the results of the timed tests. All students tended to have higher ABFCPM than SBFCPM. A total of twenty student results were used in this analysis. Students who only participated and had scores for all three bi-monthly assessments were analyzed; students who had incomplete scores were discarded.

Frequency of homework (how often assigned) was measured in this study, as well as the length of homework. Results of this action-research study indicate that the length of homework students do during a full week (Monday-Monday) is 13.56 minutes per day; whereas, the length of homework students do during a school week (Monday-Friday) is a slightly less, 13.40 minutes per day.

This research study also illustrates the following three effects: my supposition (1), that students will need large amounts of rehearsals in order to achieve fluency in solving word problems, was affirmed. My supposition (2), that students will generally feel positive towards solving word problems at home, was affirmed. And finally, my supposition (3), that homework guides will increase student effort in homework/procedural knowledge, was affirmed.

Discussion

On November 16, 2007, the participant observer placed five copies of his current research paper (at that point of time) in the school mailboxes of four teachers and one administrator. The positions of these colleagues were as follows: reading/math support teacher, kindergarten teacher, reading/math support teacher, interventionist, and school principal. The participant observer did this to ensure dialogic validity and also as a sense of

collegiality so that his colleagues may read his research up until that point and also offer feedback and insight on his research up to that point.

On November 26, 2007, the administrator returned the participant observer's paper. The participant observer reflected on the administrator's feedback and decided to modify his data displays in order to more accurately display graphs in his action-research.

On December 17, 2007, one of two reading/math support teachers emailed the participant observer stating the participant observer's paper seemed very academic. On December 21, 2007, the interventionist returned the participant observer's paper with feedback. The interventionist mentioned that timed tests for automaticity usually do not include reading except some standardized tests. The interventionist questioned if the Stanford Achievement Test was timed; it was not timed. On April 10, 2008, the kindergarten teacher returned the participant observer's paper. The paper had no feedback and was unmarked.

Students need large amounts of rehearsals in order to achieve fluency in solving word problems. Results indicated that thirteen rehearsals tended to be optimal to achieve fluency in solving addition and subtraction word problems.

Students generally feel positive towards solving word problems at home. According to student pre and post surveys, students appeared to feel positive about solving word problems at home.

Homework guides increased student effort in homework/procedural knowledge. According to parent(s)/guardian(s)' pre and post surveys, homework guides positively affected student effort in homework/procedural knowledge. Additionally, parent(s)/guardian(s)' pre and post surveys indicated parent(s)/guardian(s) feel their child

is assigned the right amount of homework. According to Markow (2007), “Parents of elementary school students appear to have an accurate sense of their children’s homework responsibilities” (p. 48). Markow’s results are uplifting to me as an educator and are identical to my study’s findings. To me, these findings mean parent(s)/guardian(s) want what is best for their child; albeit, they are still very honest with their student’s schooling.

The implications of my findings for my own work with these particular students, i.e. what the research results mean in application are as follows: students benefit from large amounts of rehearsals in order to achieve fluency in solving word problems, students generally feel positively towards solving word problems at home, and homework guides positively affect student effort in homework/procedural knowledge.

The implications of my findings for my teaching practice are as follows: I will attempt to provide students with additional time to practice basic addition and subtraction math facts in my classroom, and I will distribute homework guides at the beginning of the school year.

What I have learned will affect the way I teach the subject of mathematics forever. I plan to use Nancy Nutting’s Math Facts that Stick™ in my classroom. One of my second-grade teammates used Math Facts that Stick™ and I would be interested in seeing how effective it would be for my students.

In regards to technology and data management, I will try using an already developed computer program to help with my analysis and storage, such as the following: SPSS (originally, Statistical Package for the Social Sciences), Atlas.ti The Knowledge Workbench, NVivo7, or NVivo8.

Many questions have emerged from this study that I would like to investigate in further studies. These include, but are not limited to the following: How powerful are students' attitudes on their academic performance?, How accurate are parent(s)/guardian(s) perceptions of their child?, and What is the correlation between learning basic addition facts and learning basic subtraction facts?

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