

What Did My Students Do When They Did Their Homework Last Weekend?

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Giving student homework as learning activity is a common practice in many schools. How students complete their homework at home remains of interests. In this study, 27 of fourth graders were asked to complete their mathematics homework at home and return to school the next school day. Students were then asked to answer questionnaires after returning their homework to school. We found that parental interventions happened during homework doing process and direct teaching was involved in most of cases.

Introduction

No matter how many activities students are occupied by their school lives, most students do not come home with empty hands, but carry homework to be completed at home and returned to school the next day. Despite its use in many schools the reputation of homework is quite mixed. Some see that homework interferes with family life, that time spent on homework reduces the time for other family activities (Dudley-Marling 2003). Families are often spent time on homework and leave less time for other activities (Dudley-Marling 2003). The titles of recent popular books read like manifestos against unproductive homework assignments: that by Kohn (2006), “The Homework Myth: Why Our Kids Get too Much of a Bad thing”; that by Bennett and Kalish (2007) “The Case Against Homework: How Homework is hurting our Children and What We Can Do About It,”; and the book by Kralovec and Buell (2000), “The End of Homework: How Homework Disrupts Families, Overburdens Children, and Limits Learning.” At least in the United States there seems to be a lively debate about the value of homework.

Set against this literature are reports of research arguing that homework is of benefit. In a recent econometric analysis of US data Eren and Henderson (2008) showed a positive impact of homework on achievement that was most apparent for high and low achievers. Cooper and Valentine (2001) have argued for a positive effect of homework on achievement and Trautwein et al., (2006) have reported a positive impact of homework and student motivation. Kitsantas and Zimmerman (2009) have noted that their studies with both high school girls and college students support the conclusion that the quality of the students’ homework had a direct impact on grades and a further indirect effect that was mediated through self-efficacy beliefs.

Others have argued that homework completion and accuracy are related to academic achievement despite students’ ability levels (Keith, 1982; Keith & Page, 1985; Keith et al., 1986; Leone & Richards, 1989; Madaus et al., 2003; Paschal et al., 1984). In addition homework incomplete and inaccuracy have been related to increased referrals to special education (Anderson et al., 1986; Hutton, 1985).

Some researchers have turned their attention to the factors affecting homework quality. Trautwein et al. (2009) found that factors at the student level, especially those related to different aspects of motivation were more influential than family characteristics. In a study of one of the more practical aspects of homework Wagner, Schober and Spiel (2008) examined the amount of time a group of Austrian high school students reported as

spending on homework. For this group the average time was 11.7hrs per week with girls spending more time on their homework than boys. The study we report on here is also concerned with an examination of the practical side of homework. Our objective here was to gather from students reports on the way that their mathematics homework was completed during a typical weekend. We were also interested in the students' reports of the procedures they used in completing the problems set on that homework and their understanding of those procedures.

Method

Participants

Participants were selected from a school in Hong Kong. Twenty-seven Grade 4 students from the same class participated in this study. The average age was 9 years. The class was regarded as one of the weaker classes in terms of mathematics performance out of seven mathematics classes at that year level.

Students were given a regular mathematics homework assignment home on Friday and returned that to school on the following Monday. The homework assignment involved four fraction problems of different question types as show below. Calculate the following questions and simplify the answers.

1. Change $4\frac{2}{3}$ to improper fraction.

2. $3\frac{1}{2} - \frac{1}{2} - \frac{1}{2}$

3. $5 + 1\frac{1}{7} - 2\frac{2}{7}$

4. $5\frac{1}{5} - 5\frac{2}{5} + 1\frac{3}{5}$

In this particular mathematic homework, students were additionally asked to explain in words the ways that they attempted to solve each of the problems. In addition one question asked the students to explain in more detail how they completed problem 3.

Mathematics Homework Questionnaire

After collecting all homework assignments, the math teacher asked students to answer a "Mathematics Homework Questionnaire" on the homework assignment. The teacher explained each question to the students. Students were told that the questionnaire was designed to help teachers get a better idea of how they did their homework. There were no right answers to the questions. The questionnaire was not part of their regular school work, and students were informed that they would not be graded on their answers and that their answers were confidential. Twenty-seven students completed the questionnaire.

Result

Time and Environment

Students responded to the first four questions requesting general information about the time involved in, and features of the environment of, the homework. Most of students (17/27) did their homework on Friday night, with 5, 3 and 1 student doing the homework on Saturday, Sunday and Monday morning respectively. On average students spent 31 minutes on their homework, the range of time being between 5 and 60 minutes. Twenty-four students reported that they did their homework at home and three did it at an after-school tutorial centre. Twenty-three students did their homework without interruption.

It has been reported in some research (Benson, 1988; Patton et al., 1983), that across a range of socioeconomic background students continue to experience distractions while doing homework, such as doing homework with the television on and listening to the music. Most students (85%) in this study did their homework without distraction or interruption. In other words, the majority were provided quite a good environment when doing their homework.

Procedure Reported For Solving One Mixed-Number Problem (Problem 3)

Q. How did you work out what was required to answer math worksheet Q3? Give details.

There were 26 interpretable responses to this question. Fifteen students reported explicit use of resources that had been provided in their mathematics lessons. In this group of 15, six referred to a worksheet with worked examples that had been provided by the teacher, eight reported that they used a method that the teacher had taught them and one student reported using concrete material (blocks) that the teacher had also used in class.

Five other students reported use of a move or method suggested by parents or a tutor. The remaining six students reported use of a move that was their own interpretation of a procedure. These interpretations might have been discussed in the class.

It is interesting that when these students went home for the weekend and did their homework, about a quarter reported using resources from other people than the teacher. Another interesting feature of these reports was that 8 out of the 26 students did report use of some general problem solving procedure, like reading the question, using concrete material, writing out steps and doing it mentally.

Seeking Help

We asked students about assistance that they sought during completion of the homework, using the following questions:

Q. Did you have any difficulties in working on the Math homework problems? If yes, describes what the difficulties were.

Q. Did you seek advice from somebody while you did this Math homework? If yes, who did you seek advice from? What did you ask about?

Sixteen out of 27 students reported having difficulties. Eight students were classified as having had significant difficulties, either with not knowing specific moves, like how to

convert to simplest form, or indicating that they didn't understand key parts of the question. These might be students who would require most help in the future from the teacher. Eleven of the students reported less significant difficulties though they were able to complete the homework after some advice from a family member or tutor. Even though 11 out of the 27 students reported no difficulties, 6 of this group completed their homework with advice from parent or tutor. In other words, these students were provided sufficient family support.

What did they find difficult? Two students found it difficult to explain the procedure in words. This might be a temporary problem or it might signal a more serious problem. Two students reported a difficulty that related to the concept of mixed number and six reported difficulties with using a solution procedure. Again this might indicate just a momentary difficulty. Most significant for the teacher is that the students' reports indicated that a little over a third of the class might have needed specific follow up to address important procedural or conceptual difficulties.

Who provided the help? Fifteen out of the students received help from somebody, eight getting help from parents and seven help from tutors or sisters. Eleven of these fifteen students reported that the advice they received was helpful. Eight students asked for specific questions about either how to start a problem or how to make a specific move, one student asked for help with getting the answer, two students needed help to do the explaining in word and four did not give details of what help they needed.

The reports about difficulties and assistance sought by students have implications for the teacher in terms of what use is to be made of the information generated by the students' reports. As noted these reports do suggest the need for some follow-up of the lesson focus. It is also interesting to consider that there is potentially a reasonable amount of input into the students' mathematical understanding from families and tutors. Sixteen out of 27 students reported having difficulties.

Direct Teaching From Parents Or Tutor

Q How did she/he advise you to solve the Math homework problem?

In 11 out of 15 cases where help was sought, the help took the form of direct teaching which was quite varied, as shown in Table 1. Over half the group sought help from parents or tutor to either get started on a problem, or to resolve some part of the solution process. Parents assist children to solve problems that they can not solve without help is considered as a scaffolding process (Wood, 1980). The help the students report in our study is more direct scaffolding and some form of direct teaching was involved in most of these cases.

Table 1
Direct Teaching from Parents or Tutor

	Student	Method Different from Teacher
Direct Teaching from Parents or Tutor	A	He (father) suggested me to use lines to separate the equation.
	B	Borrow from integer first.
	C	Teach me common denominator
	D	times first and then plus
	E	Use 2 and 3 to divide
	F	to get the answer of $5 \times 5 + 1$.
	G	multiply integer and denominator
	H	Write steps
	I	converted mixed number into improper fraction,
	J	Calculate $5 - 1 + 1$ first, then it would become $4\frac{7}{7}$
	K	change values

Parental behaviors for teaching of their children have been classified in the Pratt et al. (1992) study into nine parental levels of intervention. Parent interventions at each level showed a wide range of linguistic forms, the key feature being the amount and type of information conveyed. At levels 0–2, parents offered minimal help by either saying nothing; using nonverbal gestures to begin problem, or by giving only a general hint, such as “what’s next”. The amount of help provided by parents’ increased as the parental intervention level increases. At levels 6–8, parents were seen to provide direct teaching to their children, such as telling them the answer, indicating where to record the answer and demonstrating the entire steps in a problem. In our study, parental interventions were at the higher levels of Pratt et al’s classifications.

The Most Important Thing Learned From the Homework

One question included in the questionnaire asked students

Q What is the most important bit of Math that you learned from doing this homework?

The types of responses made by students are reported in Table 2. Six students focused upon problem solving procedures associated with the problem schemas, while 14 students found that expressing the process in words was the most important. One student report could be seen as indicating that activation of the prior knowledge was the most important part of the homework. Two concentrated on effective approaches and 4 gave no specific description (See Table 2).

Table 2

Report on the Most Important Bit Students Learned from the Homework

	Most important bit	No. of std
Procedure	convert mixed number into improper fraction	6
	convert improper fraction into mixed number	
	borrow from integer	
	write the calculation process	
	write steps clearly	
Expressing in words	express the math in words	14
	express in words	
	explain the learning process	
Prior Knowledge	use a small bracket	1
Effective approach	analysis this question	2
	concentrate on my work	
Not specific description		4

It is interesting that 14 students reported that the relatively unusual process of explaining the problem solving process in words was the most important feature of the homework. It could be that the unusual nature of this requirement attracted the students' attention. Even so, we found that this is surprising and encouraging because the process of translating the number-based procedure into words does allow the child to build a more powerful explicit knowledge. This process also involves more frequent knowledge access, and provides opportunities for both elaboration of knowledge links and monitoring of comprehension. It can be seen that the requirement for students to specifically justify and explain the solution step by step in words, is a self-explanation procedure, which in other research, including that in school mathematics, has been shown to be a quite powerful way to enhance knowledge access and generation and to stimulate greater learning and transfer (e.g. Alevén & Koedinger, 2002; Atkinson et al., 2003; Cheshire, 2005; Chi & Bassok 1989; Chi & VanLehn 1991; Chi et al., 1989; Siegler, 2002; Wong et al., 2002). It is therefore suggested that a math worksheet with such an explanation section could be a useful addition to homework assignments.

Discussion

This quite simple study of the practical aspects of an instance of student reporting on the character of their mathematics homework experience points to some interesting implications. In the education system in which the student participants are studying quite substantial amounts of homework are a common feature. Yet it is a part of the students' school life that is not well documented. The results of our analysis do point to some interesting implications.

The students did interact with their families and tutors about their mathematics homework and some of these interactions are focussed on direct teaching of the topic of their school mathematics lessons. If this extra teaching is of good quality then the student is likely to be advantaged.

A second point of note is that the information provided by the simple questionnaire used here could be very useful to the teacher. Both the written solutions and the explanations provided information about the adequacy of the students' understandings.

The relatively large group of students who reports indicated difficulties would seem to need some systematic follow-up.

Finally, we think that the format of the homework assignment used in this study and the questionnaire, which included the requirement for self-explanation, could be a valuable addition to other homework assignments. The possibilities of other introducing theory-based components of homework deserve further investigation.

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