

Parents' and teachers' interaction concerning students' mathematics learning

Sonia Kafoussi

University of the Aegean, Greece

Theoretical background

Recently, it is widely accepted that the interpretation of students' behavior in mathematics classroom has to take into account factors related not only with their school environment but with their broader socio-cultural environment too. Many researchers have argued that nowadays a main purpose of the research in the field of mathematics education is the investigation of the relationship between the events occurred in the macro socio-cultural context of students' life and the micro-social context of the classroom in order to interpret the development of students' mathematical thinking (de Abreu, 2000- Lerman, 2001). Towards this effort, a research path is the analysis of the relationship between school mathematics and home mathematics (Hughes, 2001).

Many researches have pointed out that parents play a significant role in the formation of their children mathematical experiences and this fact seems to be correlated with students' success in school (Anderson, 1997- Leder, 1992-Young Loveridge, 1989). Moreover, the quality of mathematical knowledge that a child gains at home is influenced by his\her parents' attitudes and beliefs towards mathematics (Dunn, 1981- Young Loveridge, 1989). Therefore, students' home experiences influence their beliefs about mathematics as well as their mathematical activity in the classroom.

As a consequence, we could claim that any reform in school mathematics has to be discussed and be "accepted" by students' parents. If parent's involvement is crucial to the mathematics education of their children, then parents can not be founded at the margins of mathematics education (Peressini, 1998). In our opinion, this fact presupposes a good communication between teachers and parents on issues of mathematics education. Teachers usually seem to complain that parental involvement causes problems at the learning process in school, although they acknowledge that parents have their own unique opinion about the way that their children express their thinking in mathematics at home. However, little research has been done about the way that teachers and parents experience their interaction about students' mathematical development.

Towards this effort, the purpose of this paper is to investigate facets of parents' and teachers' interaction concerning students' mathematics learning in school. The research questions are the following: a) What do parents and teachers believe about their cooperation concerning students' mathematics learning? , b)How do parents and teachers interact as they discuss students' mathematical development? It has to be mentioned that this study is a part of a broader research program focused on parents' beliefs and practices in home mathematics as well as the analysis of the relationship between school mathematics and home mathematics in our country (Kafoussi & Ntziahristos, 2003).

Method

The presenting research program has been realized in two phases.

At the first phase, we recorded parents' and teachers' beliefs about their cooperation in relation to students' mathematical learning. Data was based on two questionnaires that they were addressed to the target- groups (one questionnaire for every group). The research has been done in ten elementary schools and 222 parents as well as 96 teachers of these schools participated. The children of the parents participated at the research program attended the fifth grade (38,7%) and the sixth grade (61,3%) of elementary school. The research took place in April and in May in 2003. The participation was voluntary and anonymous. The questionnaire given to the parents could be

completed by the mother or the father of the child. 74,3% of the questionnaires were completed by the mothers.

The questionnaires concluded 13 open questions concerning teachers' and parents' beliefs about issues of mathematics education. In this paper, we will present and analyze the teachers' and the parents' answers on the questions related to their cooperation in school mathematics. We will focus on questions like the following:

1)What do you believe that a teacher has to do in order to be successful in mathematics? (This question was posed in both target-groups).

2)Do you believe that a teacher has to give work at home in mathematics? (This question was posed in both target-groups).

3) Does the teacher give you instructions about the way that you can help your child in mathematics? If your answer is yes, could you describe some of these instructions?

(Respectively for the teachers: What kind of instructions do you usually give to parents in order to help their children in mathematics?)

4)Do you inform the teacher about your child's behavior in mathematics at home? Yes or no and why?

(Respectively for the teachers: Do you believe that the cooperation between teachers and parents is necessary in mathematics? Yes or no and why?)

At the second phase, data was based on our personal observations of the meetings that a teacher had with their students' parents in his school about mathematics. The research took place in 2004. The teacher had tried to organize his practice in his mathematics classroom according to the constructivist and interactionist theories about mathematics learning (cf. Cobb & Bauersfeld, 1995). Firstly, we observed two meetings that the teacher realized with all the students' parents of his classroom about mathematics. Then, we participated in meetings that the teacher realized with the students' parents individually. In these meetings, the dialogues that they were developed between the parents and the teacher were tape-recorded.

Some preliminary results

We are presenting some preliminary results about the answers that the teachers and the parents gave on the questionnaires:

1. The teachers' and the parents' beliefs about teacher's role in mathematics do not present significant differences and they could be classified as follows:

- a. The teacher as a "transmitter" of mathematical knowledge (parents 82,9%- teachers, 77%)
- b. The teacher as a "creator" of students' positive attitudes about mathematics (parents 13,5%- teachers, 16,7%)
- c. The teacher as a "facilitator" of students' construction of mathematical knowledge (parents 1%- teachers, 10,4%)

2. The parents expressed their wish to work at home with their children in mathematics according to the teachers' instructions (82%). Moreover, all the teachers (97%) seemed to believe that the work at home in mathematics is indispensable. This necessity was connected by both groups with the strengthening of the subject matter through daily training.

3. The majority of the parents (53,2%) mentioned that the teachers do not give them instructions about the way that they could help their child in mathematics. However, it is worthwhile to be mentioned that some parents interpreted this fact as an indication that their child does not have difficulties in school mathematics.

25,2% of the parents answered positively at this question. These parents described some instructions related with the teachers' advise to encourage their children in mathematics and to help

them to develop positive feelings for this subject. We could comment that the parents described instructions that they were not related to the way that they could offer some help as their children were engaged in mathematical activities at home.

In contrary, all the teachers mentioned that they gave instructions to the parents. The referred instructions could be classified in two groups. The first group concluded detailed instructions about the way that the parents should work with their children in mathematics at home (61,5%). The second group concluded general instructions about the development of the students' positive attitudes towards mathematics (39,5%).

The teachers' answers revealed that their basic concern is the avoidance of discontinuities in school and home mathematics, in relation to the way that the parents work with their children. The teachers expressed their belief that the parents have to follow the teacher's teaching style in mathematics at home. This finding shows that the teachers acknowledge the parents' significant role in their children's learning process and they try to attribute to the parents a continuation of their role at home.

The differentiation existing in the teachers' and the parents' answers about the giving of instructions is maybe due to the way that the parents interpreted this question in relation to their child's achievement. However, this inconsistency reveals a gap of communication between these two groups.

4. Although the parents are actively involved in their children's mathematics learning, they answered that they do not inform the teachers about their experiences with their children at home (43,2%). The justifications that they gave for their behavior were connected with evaluations concerning either their child or the teacher. For example, some parents answered: "No, because my child does not have difficulties in mathematics" or "No, because the teacher works well in mathematics".

On the other hand, almost all the teachers seemed to believe that their cooperation with the parents is indispensable. The reasons, that the majority of the teachers mentioned about their cooperation with parents, were connected with the confrontation of students' difficulties and the ensuring of a common approach about the way that the parents help their children in mathematics. Only 8,3% of the teachers answered that they are reserved to this cooperation.

These findings support the results of the previous question about the lack of a smooth cooperation between these two groups. The teachers seem to aim at their cooperation with the parents in order to guide their efforts in helping their children in mathematics. The parents seem to adopt a role of "assessor" about their child's mathematical development and the teacher's work.

Although, we have not space to describe and analyze the second phase of our research (the meetings that the teacher realized with the students' parents), we can notice that many parents expressed to the teacher a lack of communication with their children in mathematics. This fact had be attributed by them to the new teaching practice that the teacher had followed in mathematics. On the other hand, the teacher had tried to prevent them to support their children at home by the traditional teaching approach to school mathematics.

Comments

The above results show that the cooperation between the parents and the teachers do not seem to be smooth, although both groups seem to want it. According to our results, two issues have to be discussed. The first issue concerns the different expectations that the two groups have about the parental involvement in school mathematics. The teachers expect from the parents to continue the "teacher's role" at home. On the other hand, the parents expect to be the "assessors" of their children's mathematical development. However, we believe that if the teachers and the parents want to work together, a change of their beliefs is needed. The teachers can not expect from the parents to

“become” teachers and the parents can not have as a main concern to wield control over the teachers’ work. In our opinion, the change of these beliefs is dialectically connected with the quality of the given homework. If the homework aims at a daily training, then these beliefs will be strengthened. If the homework aims at the extension of the mathematical knowledge that the students gain in school to new contexts, then the parents’ engagement in school mathematics could have a different orientation. In this case, the construction of “home–mathematics activities” is indispensable.

The second issue concerns the strengthening of the partnership between the parents and the teachers. The parents have the need to know how they will productively work with their children at home. The formal meetings between the teacher and the parents do not seem to be enough for the parents’ information about the teacher’s approach in mathematics. The parents have to experience more profoundly the way of the teachers’ work. The organization of workshops at school, where the parents could discuss the management of some representative mathematical activities with the teacher, can help towards this goal (Sangster, 2004).

The above issues are open questions for investigation in our research program.

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