GAMES AS A MATHEMATICAL ACTIVITY: THE COEXISTENCE OF DIFFERING PERCEPTIONS IN THE PRIMARY SCHOOL COMMUNITY (TEACHERS, STUDENTS, PARENTS)

Chrysanthi Skoumpourdi & Francois Kalavassis
University of the Aegean

THEORETICAL BACKGROUND

According to many researchers, games and mathematics can be useful partners. Games facilitate children’s active construction of mathematical concepts and skills, such as numbers and operations, geometry and measurement, as well as stochastic concepts (Kamii, 1985; Ernest, 1986; Williams, 1986; Szendrei, 1996; Tapson, 1997; Caldwell, 1998; Kline, 1999; Kajander, 1999; Hansen, 2005). The use of games (Ascher, 2001; Ahmed, 2004) also develop students valuable modes of thought, increase the connections between students’ separate pieces of mathematical knowledge, reinforce their current knowledge, challenge their positive attitude towards the subject and improve their successful mathematical learning and understanding. Children learn how to cooperate and get along with their peers and their teachers (Ceglowski, 1997), as well as to improve their interaction with their parents (Hansen, 2005). Bishop (1991) considers play as one of the six “universal mathematical activities of all cultures”.

Of course a game activity should be used as a learning mathematical activity under particular conditions so that the concepts being taught have functional perspective in an intellectual and institutional framework. Otherwise, it could be limited in a Brousseau’s active a-didactical situation in which the knowledge is manifested only in the process of making decisions and where it is not important for the active subject to explain his knowledge or his decision.

Recent research publications remark that teachers, students and parents often have different perceptions of what a game is. While teachers include games in their instruction to teach concepts, children often view these games as work because the game is teacher-selected and teacher-directed (Ceglowski, 1997). From the view of the parents some believe that games are only for home use and that children cannot learn mathematics playing them (Caldwell, 1998). These different perceptions can be related to the epistemological evolution of the relationship between games, childhood and mathematics education (Skoumpourdi & Kalavassis, in press).

The purpose of our research was to investigate and describe the phenomenon of the coexistence of competitive perceptions of games and learning mathematics, not only between teachers, students and parents, but also within these three different groups. For this purpose we have created three similar questionnaires, to gather data, concerning their views on games and their views about the others’ perception of use of games in the mathematic classroom and at home.

For this conference only the portion relating to teachers’ views will be presented.
METHOD

Three questionnaires were constructed; one for the teachers, one for the students and one for the parents. The research was carried out in 10 typical state primary schools of Rhodes on December 2006 and 75 teachers completed the questionnaire. The teachers were asked the following:

- If they used games in their instruction and if so which games and in which lessons.
- If they considered that playing games in mathematics instruction can:
  - improve students knowledge and self esteem
  - enhance the cooperation between students, between students and teacher and between teacher and parents.
- If they knew what kind of games their students play at home and with whom.
- If they were ever asked by parents to recommend a game for their children. And finally they were asked
- for their general opinion on the value of playing mathematical games at home.

RESULTS

Many teachers (87%) mentioned that they used games in their instruction for all the lessons but especially for mathematics (83%) and language (64%). The games they used for mathematics instruction were mainly board games (30%) and games with manipulatives (30%). They mention that students derive many benefits about games of strategy as well as games in which chance is included, like board games with the use of dice. Pattern blocks, dice, coins, wooden beads, counters and unit sticks, pencils, buttons, seashells, etc are some of the objects that teachers used in games with manipulatives. Other games they used were pc games, games with abacus and self constructed games. They wish they have spare time for playing more games in general and particularly pc games.

All teachers (100%) considered that playing games in mathematics instruction could improve students’ personal knowledge and their ability to solve mathematical problems as well as their self-esteem. All of them mentioned that games enhanced the cooperation between students and between students and teacher. Playing games for mathematics instruction was enjoyable for all the teachers as well as for their students. In spite of the fact that all teachers answered positively to all of the above questions there were some teachers (10%) who said that using games in mathematics instruction did not enhance the cooperation between teacher and parents and that parent did not like the use of games in instruction.

As regards the kinds of games that their students play at home they quote, among others, pc games, board games and sport and playground games (table 1).

<table>
<thead>
<tr>
<th>Kind of games</th>
<th>Games they play alone</th>
<th>Games they play with parents</th>
<th>Games they play with brothers and sisters</th>
<th>Games they play with friends</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pc games</td>
<td>52 (70%)</td>
<td>-</td>
<td>19 (25%)</td>
<td>33 (44%)</td>
</tr>
<tr>
<td>Board games</td>
<td>14 (19%)</td>
<td>39 (52%)</td>
<td>34 (45%)</td>
<td>24 (32%)</td>
</tr>
<tr>
<td>Sport and playground games</td>
<td>-</td>
<td>-</td>
<td>15 (20%)</td>
<td>48 (64%)</td>
</tr>
<tr>
<td>I don’t Know</td>
<td>-</td>
<td>18 (24%)</td>
<td>17 (23%)</td>
<td>8 (11%)</td>
</tr>
</tbody>
</table>

Table 1: Kind of games and game – partners that teachers believe their students play with at home
A majority of teachers (70%) believed that children play pc games when alone. They also believe (19%) that children play board games alone. When children play with their parents they usually interact with board games. With brothers, sisters and friends children play board games (45% - 32%), pc games (25% - 44%) and sport and playground games (20% - 64%). They believed that of the games from the above table, only pc and board games were connected with mathematics. Some teachers did not know at all what kind of games their students played at home.

A large majority of teachers (75%) reported that parents do not ask them for recommendation about which games are suitable for their children. The other 25% who are asked for recommendations usually suggest board and pc games. Teachers’ opinions on the value of playing students with mathematical games at home were generally positive as they mentioned that games do help children learn in a meaningful, creative and enjoyable way. They also suggested that games should be very carefully selected.

CONCLUSIONS

Games offer an interesting mean for teaching and learning mathematics as well as for improving the relations and the communication among the persons that are involved in the educational environment. Games use natural competitive and creative instincts to stimulate learning, facilitate children’ active construction of mathematical concepts and skills, develop students valuable modes of thought, increase the connections between students’ separate pieces of mathematical knowledge, reinforce their current knowledge, challenge their positive attitude towards the subject and improve their successful mathematical learning and understanding. They reinforce the relations between students, between students and the teacher, between the teacher and parents as well as between children and parents. For this reason games should involved in mathematics education and can be in the core of the curriculum in all the educational levels.

Because teachers, students and parents often have different perceptions of the benefits of games in instruction as well as of what a game is, a research was conducted investigating these perceptions. Teachers reported that they use games in mathematics instruction such as board games and games with manipulatives; whereas students play pc games, board games and sport and playground games when at home.

They consider that games enhance the students’ knowledge and self esteem, the cooperation between students and between students and teacher as well as the enthusiasm for teachers and for students. Teachers mention that parents did not like the use of games in instruction and that games did not enhance the cooperation between them and parents.

Students should be encouraged from teachers to become creative mathematical thinkers. They should suggest them to play games for having valid mathematical experiences. These early mathematical experiences help lay the groundwork for mathematical learning in the future years.

As regards parents, they should be helped by the teacher to interact with their children and discover mathematical concepts through games. Teachers have the opportunity to help them by informing them about the potential value of playing games for mathematical learning. Since not all types of games are good for developing mathematical skills and as a game itself is not enough for the mathematical development of children, teachers should recommend parents which are the appropriate for reinforcing their children’s mathematical thinking games.
Our hypothesis was that in the primary school community there is a coexistence of differing perceptions about “if and how” mathematical learning activities can be emerged by games. This hidden coexistence is an obstacle for the design of an operational and instructional use of the games in the teaching of mathematics which has epistemological dimensions.

REFERENCES


Ernest, P. (1986). Games a rationale for their use in the teaching of mathematics in school Mathematics in School Vol. 15, No 1


Tapson, F. (1997). Mathematical Games Mathematics in school Vol. 26 No 4

Williams, M. (1986). The Place of Games in Primary Mathematics Mathematics in School Vol.15, No 1 (pp. 19)