



DOI: 10.18427/iri-2016-0066

Importance of Mathematics Education at Kindergarten Level: Perspective of Parents

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Parental involvement in children's mathematical education is important at all stages of child development. In our paper, we focus on the importance of parental involvement in children's mathematical development in early childhood. We present the study which was aimed to explore how parents of kindergarten children perceive the importance of kindergarten mathematics education. A total of 300 parents of children enrolled in various kindergartens in Slovenia completed a questioner. The aim of our research was to find out whether parents identify mathematics as one of the areas of the kindergarten curriculum, what is parents' perception of whether it is reasonable to introduce mathematics contents to kindergarten students and whether parents identify mathematics contents which are supposed to be introduced to children at a kindergarten level. The data were analyzed using descriptive and inferential statistics. Results showed that three-quarters of all participating parents are aware of mathematics as one of the areas in the curriculum. Findings also indicated that the majority of participating parents perceive introducing mathematical content in kindergarten as reasonable. Furthermore, findings suggest that parents' opinion regarding introducing mathematics contents at kindergarten level is related to parents' education. Moreover, results showed that parents are quite good at recognizing mathematical contents that are supposed to be introduced to children at a kindergarten level. However, it is surprising that among various topics the data management, basic number operations and measurement were three contents that were perceived as topics that are not supposed to be introduced to children at kindergarten level for more than half of parents. Findings also suggest that parents' perspective of the importance of mathematics education at kindergarten level are related to parents' education.

Introduction

Parents are an important partner in child's education, also in the area of mathematics education. Various authors (e.g. Hartog & Brosnan, 1994; Freiberg, 2004; Hoover-Dempsey et al., 2005; Antolin, 2010, 2014) emphasize the importance of parental involvement in children's mathematics education. The parents' role has been documented as very beneficial for child's mathematical development, for the development of child's attitude towards mathematics and for many other aspects of the child's mathematics education. Within parental involvement in mathematics education special attention is given to mathematical activities of parents and children. Part of the *TIMSS 2011* (2012) also applies to this area. Parents were asked to report how often were they involved in child's preschool math activities at home (e.g. counting different objects, playing with shapes and bodies, playing board games, card games...). Findings showed that percentage of Slovenian children who were often or sometimes included in preschool math activities with their parents is rather similar to the international average. *TIMSS 2011* revealed interesting finding on the connection between children's mathematics achievements and frequency of mathematical activities at home performed by children and their parents. Thus, findings showed that mathematics achievement of fourth graders who were often involved in mathematical activities with their parents (observing international average) differ by 17 points from those who were sometimes involved in such activities, while the difference between mathematics achievements of fourth graders who were often and never enrolled in mathematics activities with their parents is much bigger (50 points).

Moreover, *TIMSS 2011* for the first time collected data on children's mathematical skills before entering school, with a special questionnaire for parents. Namely, many studies around the world show that the children's mathematical knowledge at their entrance to the school is one of the most important predictors of their subsequent achievements (e.g. Princiotta, Flanagan & Hauska, 2006). Slovenia is, according to *TIMSS 2011*, among the countries with below-average proportion of children for whom the parents estimated that children's early mathematics knowledge is very well. The proportion of children in Slovenia whose early mathematics knowledge is according to their parents very well is only 12%; that proportion is much smaller than international average (25%) and three times smaller than in Finland.

One of the important factors in parental involvement in children's mathematics education is parents' perception of mathematics and whether they consider mathematics knowledge to be important for their children. Several studies in the past documented that parents or caregivers find children's social skills and general knowledge more important than children's mathematics skills (e.g. Georgiou & Tourva, 2007, Skwarchuk, 2009). Moreover, Cannon and Ginsburg (2008) in their study also found

that parents think that mathematics should be less emphasized in the preschool curriculum.

Parental involvement in mathematics education at kindergarten level hasn't been given much attention among Slovenian studies. Therefore, with this present research, we are trying to draw attention to the importance of parental involvement in mathematics education also at kindergarten level and to explore some of the parents' perceptions on child's learning mathematics in kindergarten.

Research questions

In our paper, we focus on the importance of parental involvement in children's mathematical development in early childhood. The present study was designed to explore how parents of kindergarten children perceive the importance of kindergarten mathematics education. In particular, the study examined whether parents identify mathematics as one of the areas of the kindergarten curriculum, what is parents' perception of introducing mathematics contents to kindergarten students and whether parents identify mathematics contents which are supposed to be introduced to children at a kindergarten level.

Methodology

In our investigation, we used the descriptive and causal – non-experimental method of empirical research. The data was collected with the use of a survey questionnaire administered to parents at kindergartens.

A total of 300 parents of children enrolled in various kindergartens in Slovenia participated in this study. Of participating parents, 253 were females and 47 were males. Most parents (74%) were aged 30-39 years, 17% parents were aged 20-29, and 10% of parents were aged 40-49 years. Of all participating parents, 12% did not graduate from high school, 44% had a high school degree and 44% had a bachelor's or master's degree. For comparison of parents' perceptions of mathematics at kindergarten level regarding parents' educational level, parents will be grouped into three groups: those, with lower, middle and higher education.

We used basic descriptive statistics and statistical inference to identify the differences in the perceptions of parents. To determine differences in their education level we used χ^2 -test.

Results

The results are presented in three sections: Section 1 shows the parents' awareness of mathematics being one of the areas of the kindergarten curriculum. Section 2 shows the parents' perception of introducing mathematics contents to kindergarten students. Section 3 shows parents' abilities to identify mathematics contents that are supposed to be introduced to children at a kindergarten level.

1. Parents' awareness of mathematics being one of the areas of the kindergarten curriculum.

Results show that three-quarters of all participating parents are aware of mathematics as one of the areas in the kindergarten curriculum. 3,7 % of the parents think that mathematics is not part of kindergarten curriculum, while 21,3 % of parents don't know whether mathematics is one of the areas in the kindergarten curriculum.

Table 1. Parents' awareness of mathematics being one of the areas of the kindergarten curriculum regarding their education

Mathematics in curriculum		Level of education			
		Lower	Middle	Higher	Total
Yes	f	15	96	114	225
	f%	40,5	72,7	87	75
No	f	5	4	2	11
	f%	13,5	3	1,5	3,7
I don't know	f	17	32	15	64
	f %	45,9	24,2	11,5	21,3
Total		37	132	131	300
$\chi^2 = 37,07; P = 0,000$					

There was a statistically significant difference (Table 1) between the parents' awareness of mathematics being one of the areas of the kindergarten curriculum regarding parents' educational level ($P = 0000$). The higher educated parents are more aware that mathematics is one of the areas in the kindergarten curriculum while almost half of the parents with lower level of education don't know if mathematics is included in kindergarten curriculum or would even believe that it's not included (13,5%).

2. Parents' perception of introducing mathematics contents to kindergarten students.

The survey revealed that majority of participating parents (94 %) perceive introducing mathematical content in kindergarten as reasonable. Only 4 % of the parents believe it is not reasonable to introduce

mathematics contents at the kindergarten level. 2 % of the parents choosed answer Other.

After expressing their perception of introducing mathematics contents to kindergarten students parents were asked to illustrate their answer with their own comment. Parents who believe that the introduction of mathematical content in the kindergarten is reasonable were stressing: the importance that children get acquainted with math concepts through games, the importance of development of mathematical thinking, the introduction of mathematical content in kindergarten as preparation for school, the acquisition of mathematics basics. Parents were also mentioning the importance of mathematics in everyday life and the importance of developing a positive attitude towards mathematics.

Parents who believe that the introduction of mathematical content in kindergarten is not reasonable explained their perceptions with reasons like that it is too early, that children should be given more time, that children will be overloaded in school that's why they should play while they are still in kindergarten. Some of the parents' comments are presented below:

Metka: *"I think it's too early. Already in school it will get too demanding."*

Alenka: *"They are still too small... Also in school, it will be too much for them."*

Sonja: *"It's too soon."*

Vlasta: *"I think that children should play in the kindergarten because then later in the school they will be to overloaded. School requires too much!"*

Parents who choosed answer Other argued that they don't know if introducing mathematics concepts is reasonable since sometimes not even adults develop mathematical reasoning. Some of them stress out that mathematics contents could be introduced but they don't see the need why they would have to be introduced. Some of them also expressed the belief that it is more important to give more emphasis on language development.

Table 2. Parents' perception of introducing mathematics contents to kindergarten students regarding their education

Introducing mathematics contents to kindergarten students		Level of education			
		Lower	Middle	Higher	Total
Yes	f	30	123	129	282
	f%	81,1	93,2	98,5	94
No	f	5	6	1	12
	f%	13,5	4,5	0,9	4
Other	f	2	3	1	6
	f %	5,4	2,3	0,8	2
Total		37	132	131	300
$\chi^2 = 16,04; P = 0,003$					

The study revealed an encouraging finding that majority of the parents share the opinion that mathematics contents should be introduced to children at a kindergarten level. However, there is a statistically significant difference between the parents with different levels of education concerning the perception of introducing mathematics contents to kindergarten students ($P = 0003$). Higher-educated parents believe that mathematics contents should be introduced to kindergarten students more than the parents with lower levels of education. 13,5 % of parents with lower education don't agree with introducing mathematics contents to kindergarten students while the percentage of parents with the same opinion among parents with middle education is lower (4,5 %) and among higher educated parents the lowest (0,9 %).

3. *Parents' abilities to identify mathematics contents that are supposed to be introduced to children at a kindergarten level.*

Table 3. Parents' abilities to identify mathematics contents that are supposed to be introduced to children at a kindergarten level

Mathematics contents		Yes	No	Total	χ^2	P
Seriation and classification	f	242	58	300	22,75	0,000
	f%	80,7	19,3	100		
Counting	f	251	49	300	24,187	0,000
	f%	83,7	16,3	100		
Basic number operations	f	85	215	300	9,637	0,008
	f%	28,3	71,7	100		
Patterns	f	166	134	300	37,166	0,000
	f%	55,3	44,7	100		
Measurement	f	95	205	300	30,437	0,000
	f%	31,7	68,3	100		
Data management	f	56	244	300	26,895	0,000
	f %	18,7	81,3	100		
Logical thinking	f	212	88	300	15,906	0,000
	f %	70,7	29,3	100		
Geometrical shapes	f	241	59	300	16,88	0,000
	f %	80,3	19,7	100		

Table 3 shows that the majority of parents believe children at kindergarten level are supposed to be introduced to counting (83.7%), activities of seriation and classifications (80.7%), geometrical shapes (80.3%) and activities that encourage development of logical thinking (70.7%). A little bit more than half of all participating parents (55.3%) believe that children at kindergarten level get acquainted also with patterns.

For other listed mathematics contents most of the parents believe that they are not supposed to be introduced to children at kindergarten level. It is very surprising that 71,7 % of the parents think that children are not going to get familiar with basic number operations in kindergarten. Even more surprising is the finding that 68,3 % of the parents think that in kindergarten their children are not supposed to be introduced to concepts

related to measurement even though measurement is one of the contents that is the most connected to everyday life, so children would get familiar with it or at least get some experiences with measurement also outside kindergarten. Another surprising finding is about data management. This content is believed by most of the parents as content that is not introduced to children at kindergarten level despite the fact that graphing and other activities involving data management are very common in Slovenian kindergartens.

The results show that there are statistically significant differences between the parents with different levels of education when identifying mathematics contents that are supposed to be introduced to children at a kindergarten level. For all the contents it was found out that the higher educated parents believe that certain content is supposed to be introduced at kindergarten level in a greater share than the parents with lower levels of education.

Discussion and conclusion

The current study examined perceptions of parents of kindergarten children on mathematics education in kindergarten.

Our findings suggest that most of the parents are aware of mathematics as one of the areas in the curriculum. Furthermore, findings also indicated that the majority of participating parents perceive introducing mathematical content in kindergarten as reasonable. These results are encouraging especially considering findings of some other studies who documented that parents think there should be less mathematics in preschool curriculum (e.g. Cannon & Ginsburg, 2008). Research shows that parents with higher levels of education compared to parents with lower levels of education are more aware that mathematics is part of kindergarten curriculum and they also believe in greater share that mathematics should be introduced to kindergarten children. These results are generally consistent with findings of several prior parental preschool-involvement studies who suggest that parents with higher levels of education are more involved in children's preschool education (e.g., Castro, Bryant, Peisner-Feinberg & Skinner, 2004; Fantuzzo, Tighe & Childs, 2000) and therefore they are probably more familiar with preschool curriculum.

Moreover, our study showed that parents are quite good at recognizing mathematical contents that are supposed to be introduced to children at a kindergarten level. However, it is surprising that among various topics the data management, basic number operations and measurement were three contents that were perceived as topics that are not supposed to be introduced to children at kindergarten level for more than half of parents. Finding regarding data management is particularly surprising, especially because various graphs (bar charts, pie charts...) are often exposed on walls of kindergarten classrooms or hallways. However, despite seeing

graphs daily parents did not recognize data management as content that children should be introduced in kindergarten. One of the reasons might be that parents are not familiar with the expression 'data management' and therefore weren't aware it is a content related to collecting and representing data using various graphs. Our finding also revealed that more than 70% of the parents think that basic number operations should not be introduced to kindergarten children. We believe that more attention should be given to introducing parents how crucial early number competencies are for elementary school mathematics. Namely, handful of studies suggests that children's mathematics performance in kindergarten predict their achievement in later grades (e.g. Jordan, Kaplan, Locunial & Ramineni, 2007; Aunola, Leskinen, Lerkkanen & Nurmi, 2004; Princiotta, Flanagan & Hausken, 2006). Our study also suggests that parents' abilities to identify mathematics contents that are supposed be introduced to their children at kindergarten level are as well related to parents' education. That finding is consistent with prior research who suggest that parents with higher levels of education are more involved in their children education (e.g. Fantuzzo, Tighe & Childs, 2000). We believe that higher level of involvement enables them to become more familiar with mathematics contents that are introduced to their child at kindergarten level.

Summarizing, this research examined perceptions of parents of kindergarten children on mathematics education in kindergarten. This study should be considered as an effort for awake the awareness of how important parents' perceptions on children's mathematics education are. These results shed new light on how Slovenian parents view mathematics teaching and learning at kindergarten level and what mathematics contents they believe their children should get to know before entering school. Findings suggest that especially parents with lower levels of education need more information on mathematics education in kindergarten level. Furthermore, we also believe that parents regardless of educational level should be provided with information on how crucial early mathematical skills are for child's further mathematics education and how to effectively encourage and help their children to develop those skills, both in kindergarten and at home.

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