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WHERE DOES MATHEMATICS EDUCATION START? CONNECTING THE PRESCHOOL CURRICULUM AND THE HOME ENVIRONMENT[1]

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Abstract

The paper presents a study conducted within a broader scientific project named *Contemporary approaches to the teaching methodology of mathematical education in early childhood*. The theoretical background is based on the assumption that a family context in which children grow up can influence the early maths development and knowledge that they bring into an educational system. This survey, conducted on the sample of 250 parents of six-year-old children who attended a public preschool institution in Banja Luka, was presented in the article. The study correlates the children's home activities with factors connected to the socio-economic status of their respective families (parents' education, income, and profession and possession of toys and playing materials at home). Although the survey results partially confirm the hypotheses, some implications for both mutual impacts and interconnection of the preschool curriculum, as a vision of early childhood mathematical education experts, on the one hand, and, on the other hand, family environment, offering initial support for children's mathematical development, can be set.

Key words: early childhood, mathematical education, home environment, preschool curriculum, mutual impacts.

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Introduction

It is generally accepted that institutional education of young children is closely related to family education in the early years and that it is specific manifestation of extension and expansion of a family education (Kamenov, 2002). Furthermore, a family environment is to be the first favourable and stimulating space for children's learning and development (Garvis & Nislev, 2017), although many studies suggest that the factors of parental and family environment, especially those of low social-economic and educational status, can be a disadvantage for children's development very early in their life, even at the age of three (Blevins-Knabe, 2016; DeFlorio & Beliakoff, 2015; Dumas et al., 2019; Garvis & Nislev, 2017; Klein et al., 2008; Phillipson et al., 2017). Cross-cultural research show that the impact of these factors is strong to the extent that it can manifest negatively on the quality and richness of children's mathematical experiences later in their academic achievements (Baker et al., 2002; Chiu, 2010; Newton & Alexander, 2013). Besides, different kinds of home activities and ways of parental engagements and expectations for learning can be correlated with children's achievement in early numeracy (Blevins-Knabe, 2016; Zhu & Chiu, 2019). Bearing that in mind, "parents remain the primary architects of a child's experiences, both through their selection of the childcare environment and through the experiences the child encounters at home" (Blevins-Knabe & Berghout Austin, 2016, p. 1).

On the other hand, there is an increasingly clear attitude that children at a very early age are able to construct their mathematical knowledge and skills, and gain various experiences even outside the formal guidance and impact of the formal education (Blevins-Knabe, 2016; Clements & Sarama, 2004; MacDonald, 2015). Research show that children very early begin to show spontaneous interests in mathematics (Björklund & Pramling, 2017), which is now directly associated with congenital predisposition and the period of brain sensitivity when the child has to experience the most important and optimal challenges for the modification of brain structures (according to COII, 2010). Early mathematics experiences tend to be important predictor of children's future achievement (Dunst et al., 2017).

From their home context, children may bring different learning, different developmental, living, and playing experiences into institutional education, so between them there can be some differences that may very slowly be compensated over time within the systematical influences of preschool curriculum. Meta-analyses shows that children with upper SES family background tend to be more motivated to learn and have better developed skills (Byrnes & Wasik, 2009). Therefore, solid preschools programs for mathematical development must respond to intellectual needs of such children, since they feature remarkable plasticity in the period of early childhood and involve factors of home environment into mathematical development (Clements & Sarama, 2009; Cross et al., 2009), Given the above, it can be addressed to *The opportunity - prosperity framework* (developed by Byrnes and colleagues, see more Byrnes & Wasik, 2009), as one of the newest theoretical frameworks for analysing the factors that contribute to mathematical achievements, focusing on the opportunities, which are "opportunities to learn as culturally defined contexts in which an individual is presented with content to learn (e.g., by a teacher or parent, an author, etc.) or given opportunities to practice skills" (Byrnes & Wasik 2009, p. 168).

As mathematical activities and experiences in early math learning of young children begin as individually and socially driven and shaped learning situations within different environments, the study focused on some aspects of home as the first environment where children actively begin to acquire experiences in early mathematics and construct their knowledge and skills that can be connected with learning outcomes of preschool curriculum.

A few theoretical notes and pieces of empirical evidence on influences of home environment on mathematical knowledge in early childhood

Theoretical perspectives. The broader theoretical framework for the study can be found in Bronfenbrenner's ecological theory of children's development (Bronfenbrenner, 1979; Lepičnik Vodopivec, 1996; Pribišev Beleslin, 2016). A child develops within complex, mutually conditioned systems, which include family environment with its own habits, rituals, patterns, values, perceptions, attitudes, understandings, culture, peer communities, preschool institutions, and development of mathematics education at the system level as the elements of meso-system. In addition, this includes the public opinion regarding the importance of mathematics and mathematics education in society, as the elements of macro-system as well.

Another assumption is based on the theories of etnomathematics and children's cultures. Mathematics is a cultural phenomenon, and there are some universal contents which can be found in every culture, not just in "western mathematics" (Bishop, 1988; Rosa & Orey, 2011). One of the concepts of this theoretical position is existence, or crystallisation, of mathematics with small "m", which belongs to children, which for adults may seem equally exotic as any foreign culture (Presmeg, 1998, p. 66). According to this approach, culture of children's math is connected with the processes of socialisation and acculturation. The social group in which a child grows up develops specific relationships according to mathematical realms, including those belonging not only to a broad culture, but also those belonging to the subculture of a family context. In this process of socialisation with, adoption of, and accommodation to the already constructed systems of relationships, mathematical systems are important, that is, usually determined by academic and professional communities. Parents, when interacting or playing with children, can bring into their home culture "mathematising" when connecting children's experiences with mathematical principles (Ginsburg et.al., 2008, see Blevins-Knabe, 2016, p. 16). That is based on parents' mathematics-based communication and interaction with their children (Garvis & Nislev, 2017), but also on "stimulation, support, structure, and social integration" (Bradley & Corwyn, 2004, 2006, as cited in Blevins-Knabe, 2016, p. 16). These parental approaches can be similar to a broad social practice in non-formal education settings for young children (strengthened by tradition, by the media, by popular psychology, etc.). Another process is acculturation, which, as a mutual process, involves learning and immersion of adults into the mathematical culture shaped by the children, and mainly manifested as "real-world-math" in spontaneous play (Garvis & Nislev, 2017; Gifford, 2005; Pribišev Beleslin, 2013; Šindić et al., 2015; van Oers, 2010). One of the important features of parental impact on mathematical development is their spontaneous intention to support children's play and to provide opportunities for playing.

The third theoretical assumption of the study focuses on learning mathematics at an early age as a social activity, which is shaped through children's and adults' participation in "communities of practice". Learning of math should be based on gradual internalisation of different cultural and social contents and symbolic tools by participants through living in the society. Mathematics belongs to culture and civilisation in the broadest sense of the word (Clements & Sarama, 2004). According to Rogoff (2003, p. 71), every generation of children is ready to learn to participate in practice and tradition, through engagement in activities that are meaningful and important to the community.

Empirical perspective. The qualitative study which preceded the survey described in this article, within the same broader scientific project named *Contemporary approaches to the methodics of mathematical education in early childhood* (Pribišev Beleslin, 2017), shed light on children's mathematical knowledge and experiences that parents observed in their respective family environments.

The responses of mothers and fathers of 128 children aged five to six years, who answered the questions in the total sample of 386 parents, were analysed. With the aim to explore the parents' insights on mathematical experiences of six-year-olds at home, the qualitative study focused on tacit and intuitive mathematical knowledge and skills preschool children gained in daily life, play, and broader activities in home environment (Pribišev Beleslin, 2017, p. 359). A content analysis was used, which simultaneously processed both quantitative data (the frequency of parents' statements about certain mathematical content and mental processes that they notice in their children in everyday situations) and qualitative data, in which patterns related to similarities and differences in the expression of certain topics were searched for, such as mathematical concepts, contents, and processes. First, the general categories describing the parents' responses with regard to the frequency and similarity of the content were separated, and then the analysis focused on each of these categories.

As a result of the study, qualitative categories based on parents' answers were selected as follows: ‘’*numerical base for exchange of goods*“, ”*time relationships and the passage of time*“, ”*automatism in arithmetic processes*“, and ”*noticing properties of numbers*“. The study reveals that parents can identify complex mental processes, equally those at the level of their children's actions with objects and at the level of their interactions with abstract and verbal numerical mathematical concepts. This is especially noticeable in *children's attitude towards the exchange of goods which includes quantities and numbers*, that is, in situations when they go shopping with their parents. It is characterised by the appearance of simple to complex approaches to mathematical operations, at a concrete, objective level, as well as at mental and verbal levels. Several responses from parents illustrate this category of children's mathematical knowledge:

We went shopping and Neda had her BAM 15.00. When she asked me how much the jeans cost, I told her that they cost BAM 20.00, and Neda said: ''You still need to get me BAM 5.00."

The situation when my son goes to the market: - a lollipop is BAM 0.30, - a bag of snacks are BAM 0.50, and a container of milk is BAM1.80. He himself calculates that he needs BAM 2.60. When it comes to money, he calculates very well!

Further, a complex understanding of *the concept of time relationships and the passage of time* was often connected with a time line, but also with human development and with a flow of time and events. According to parents' observations, children are particularly interested in reflections and insights into temporal relations related to human life, life cycles, and development, although they apply a large percentage of their temporal knowledge in anticipation of (family) events that are dear to them, in which they place temporal relations and predict a course of events. A few parents' insights on their children's knowledge about temporal relations:

When we meet an older friend, who is 10 years old, Maria says: „Mom, if I am 6 years old, and Anja is 10 years old, she is 4 years older than me!"

„Mom, how old are you? - 36. - That's too many years!"

We were waiting to enter the kindergarten, and Petar asked what time it was. I said it was 4 hours and 50 minutes, and he asked how soon we could enter the kindergarten. I told him in 5 minutes, to which he said, „Then it will be 4 and 55!"

Further, *automatism in arithmetic processes* appeared as a huge category of children's mathematical knowledge, nested into home routines such as shoping or children's play, and it showed additional children's skills, of division and multiplication, at manipulative, verbal, and mental levels. Most often parents notice the mathematical operations of addition and division, but there are examples of those of multiplication and subtraction (mainly when a child uses money or goods that belong to them and can be quantified, such as candies, fruits, and so). In most cases, operations with numbers comprise figures up to 5, that is, up to 20 in terms of shopping, although in some answers some much more complex knowledge about and handling of numerical operations on the mental plane is recognized. Children set themselves complex real-situation-based problems and intuitively use mathematical language to communicate with others (examples of verbal tasks set by children: ''One 'bekutan' cream is BAM 2.00, you have to give me BAM

4.00 to buy two!“ or “Come on , mom, I have 5 apples, and if I give you 3,how many will remain for me ?“).

As the fourth category, which is the rarest one, the usage of number properties in real and symbolic contexts and in the nominal meaning is observed in the parents’ answers. Children use labels, symbols, meanings, estimation, and the place-value representation for the purpose of grouping, for intuitive understanding of the principle of cardinality, for usage of ordinal relations, and for other mathematical contents in everyday activities. Parents notice that children are interested in the meaning of numbers in traffic, on the streets, in the market, in terms of the flow of time (time line), and the like. Within this category, children showed abilities to transform a mathematical problem into everyday stories, meaningful in their world. The following are a few parents’ observations:

He often asks about numbers and big digits (to explain the numbers 1,000 and 10, 000, etc.), and he wants me to explain to him the numbers starting with 1 and featuring 5 or 9 zeros.

Yesterday he told me that he knows how to count to 100, so he told how he will count to me, but because he needs a lot of time, he will skip 10s at a time until he gets to 100.

Therefore, the experience and mathematical knowledge that children build in their home environment must become the first step in the process of mathematics education in the early childhood, and they must be respected as a potential that pushes the process to its optimum level, which is one of its goals.

Method

Starting with previous theoretical assumptions that highlight the importance of family context in which a child grows up, which can influence the early development in mathematics and knowledge that children bring into an educational system, an empirical research, quantitative in its character, was conducted. *The aim* was to investigate into and to correlate the ratio of representation of children’s activities at an early age that contribute to the acquisition of mathematical knowledge and skills with some factors of the socio-economic status of their respective families (education and financial status of parents, and a relationship between parental jobs and mathematics). The research technique that was used to collect data was a survey, conducted in 2018.

For research purposes, an *instrument* was built that followed two groups of *research variables*, set in two layers:

The first variable (dependent) represents children's activities favourable for the acquisition of mathematical knowledge, experiences and skills, such as, mathematical and ICT courses for young children, games with rules (chess, dominoes, etc.), constructive play with blocks, "Lego" blocks, dices and cubes, outdoor activities, and mutual activities with mathematical contents (numeracy, geometrical shapes, etc.), and possession of toys and playing materials at home (stimulus for mathematical development)

The second variable (independent) consists of the groups of factors connected with the socio-economic status of a respective family : (1) education of the father; (2) education of the mother; (3) the connection of father's work with the mathematical knowledge and skills; (4) connection of mother's work with the mathematical knowledge and skills; (5) estimation of the family's financial situation.

The research hypotheses that we attempted to statistically prove were:

H1 There is a statistically significant correlation between the parental socio-economic and educational status (parental education, family financial situation, connection of parental vocation with mathematics) and owning toys and play materials suitable for learning mathematical contents.

H2 There is a statistically significant correlation between the parental socio-economic and educational status and possession of play materials and the proportion of children's activities at an early age that contributes to the acquisition of mathematical knowledge and cognitive skills.

The research sample: the convenience sample consisted of 250 parents of preschool age children enrolled in the Centre for Preschool Education Public Institution in Banja Luka. This sample was taken from the entire sample of this scientific research project, which consisted of 386 children and their parents. The sample included responses from the parents who correctly filled out their questionnaires.

Results and discussion

After grouping the obtained data, the calculated Shapiro-Wilk test showed that the distribution of the data obtained numerical variables (for the group of factors that comprises the first variable) that met the requirements of the use of parametric tests. Due to the nature of variables that were not spread properly we used nonparametric tests.

The calculated Spearman's correlation coefficients shown in Table 1 indicate a relationship between the socio-economic and educational factors of family context in which a child grows up (parental education, family financial situation, owning a toy, the association of parental jobs with mathematics).

Table 1

Spearman's coefficients of family contexts within the child grows up

		Financial situation in family	Father's educational level	Mother's educational level	Similarity of father's job with maths	Similarity of mother's job with maths	Owning the toys and play materials at home
Financial situation in family	ρ	1.000	0.303**	0.213**	-0.034	-0.057	0.236**
	p		0.000	0.001	0.591	0.366	0.000
Father's educational level	ρ	0.303**	1.000	0.524**	0.107	0.096	0.162*
	p	0.000		0.000	0.091	0.132	0.010
Mother's educational level	ρ	0.213**	0.524**	1.000	0.026	0.175**	0.158*
	p	0.001	0.000		0.679	0.006	0.012
Similarity of father's job with maths	ρ	-0.034	0.107	0.026	1.000	0.160*	0.063
	p	0.591	0.091	0.679		0.012	0.321
Similarity of mother's job with maths	ρ	-0.057	0.096	0.175**	0.160*	1.000	0.135*
	p	0.366	0.132	0.006	0.012		0.033
Owning the toys and play materials at home	ρ	0.236**	0.162*	0.158*	0.063	0.135*	1.000
	p	0.000	0.010	0.012	0.321	0.033	

*Note:**Correlation is statistically significant at the level 0,05 (2-tailed),
**Correlation is statistically significant at the level 0,01 (2-tailed).

The variable of financial situation in family significantly correlated with the variables of parental education and owning the toys and playing materials that are stimulating for the cognitive (as well as mathematical) development at the significant level of 0.01 ($\rho = 0.303$, $p = 0.000$; $\rho = 0.213$, $p = 0.001$; $\rho = 0.236$, $p = 0.000$, respectively). The negative sign of correlation of the variables of financial status of family and of similarity of parental jobs with mathematics in both parents may indicate the tendency for a favourable economic situation of family that is caused by well paid jobs connected to mathematics, which is one of the reasons mathematics is valued nowadays (Clements & Sarama 2004).

Owning toys in home environment significantly correlated with father's and mother's education and with the similarity of their jobs with mathematics (for fathers) at the significant level of 0.05, and with material (financial) conditions in the family at the significant level of 0.01 ($\rho= 0.162$, $p = 0.010$; $\rho = 0.158$, $p = 0.012$; $\rho = 0.135$, $p = 0.033$, respectively). Since Spearman's coefficients have the positive sign, these connections are in a proportional relation, that is, if one variable increases, the other variable increases as well.. The findings indicate that families with favourable material and financial conditions, featuring well- educated parents, with mother's work closely related to mathematics, own more toys that are stimulating for the cognitive and mathematical development. Such toys are building blocks, constructors and similar materials, didactic toys and the like. One study showed that, in global terms, "physical family resource variables" are correlated with mathematics achievement (Chiu, 2010, p. 1645). Children, growing up in families with more learning and cultural materials (toys, books) tend to score better in school mathematics (Chiu, 2010). All this points to the connection between certain family situation in terms of mathematical favourable learning environment for the child, which is similar to some previous research that indicate factors of family environment connected to children's early mathematical experiences, such as parents' education, family socio-economic background, parents' attitudes towards mathematics, their expectations, and others (see Dunst et al., 2017). Parents with different SES factors tend to perceive and value education and see effects of education of their children in different ways (Phillipson et al., 2017). Furthermore, the research the correlation with the variables of home environment and parents' SES (DeFlorio & Beliakoff, 2015; Phillipson et al., 2017). In addition, the Heyneman-Loxley effect, a model from the 1970s, with modifications within the research from nowadays, tells us that there is a "symbiotic relationship between these two institutions", family and schooling (Baker et al., 2002, 310). Investment in mass education at the national level, which is connected with the economic development of a country, can be effective for directly raising the SES factors in family environment, better educated parents in particular.

Because of the factors that statistically significantly correlated in this study, it can be concluded that the hypothesis *H1* is partially proved.

Table 2 presents the correlation (Spearman's coefficients) obtained by crossing variables grouped around socio-economic factors of family environment (parents' education, financial situation of the family, owning a toy, the association of parental engagement with mathematics), on the one hand, with the variable that represents children's activities favourable for the acquisition of mathematical knowledge, on the other hand.

Table 2: Spearman's coefficients of family context within which the child grows up and children's activities

		Financial situation in family	Father's educational level	Mother's educational level	Similarity of father's job with maths	Similarity of mother's job with maths	Owning the toys and play materials at home
Children's activities	ρ	0.160*	0.157*	0.081	-0.020	-0.018	0.181*
	p	0.014	0.016	0.217	0.760	0.782	0.006

*Note:**Correlation is statistically significant at the level 0,05 (2-tailed),
**Correlation is statistically significant at the level 0,01 (2-tailed).

Based on the results (Table 2), the following can be concluded: the variable presenting children's activities for the acquisition of mathematical knowledge and skills (in families), significantly correlated at the level of 0.05 with the financial situation of the family, wuth father's educational level, and with the possession of (appropriate) toys at home ($\rho = 0.160$, $p = 0.014$; $\rho = 0.157$, $p = 0.016$; $\rho = 0.181$, $p = 0.006$, respectively).

Studies on children's activities in home environment indicate the existence of direct and indirect activities, in which parents teach their children some mathematical content, mostly numeracy (LeFevre et al., 2009).

Parents provide early experience arranging the material and social environment for children's development and learning through immersion into the broad culture of mathematics community, encouraging children's participation in these spontaneous and meaningful activities at home. The studies on parental activities in home leading to mathematics experiences showed that games with rules, playing with the math-related contents, themes, and toys (within the symbolic and dramatic play), owning children's books, educational television and computer programs focused on numbers, and even home routines were the most frequently valued home activities (see more DeFlorio & Beliakoff, 2015; Linder & Emerson, 2019). The same study shed light on the fact that he educational goals and structures of these activities were more complex for children belonging to middle SES group (DeFlorio & Beliakoff, 2015). The research that correlate parents activities and academic achievements in mathematics are less developed in comparison to the research of early literacy activities at home (Blevins-Knabe, 2016; LeFevre et al., 2009). Studies pointed out that in terms of parental-directed mathematics teaching, expectations about their children's academical success (DeFlorio & Beliakoff, 2015), and expectations from preschool curriculum, a home environment is more effective for children's academic success (see more Klein et al., 2008). Besides, lower SES parents believe that kindergarten has more effects on their children's success in comparison to middle SES parents. On the other hand, studies showed that parents' involvement in indirect games with their children have positive impacts on both the quality of children's mathematical experiences at home and acquisition of mathematical contents later, during early stages of schooling (Phillipson et al,. 2017). Parents playing with their children numerical or calculation games, as well as parents talking with their children about mathematical contents, can predict children's mathematical abilities in preschool curriculum and in the beginning of their formal schooling (Blevins-Knabe, 2016, p. 16). Based on the results presented in Table 2, it can be concluded that the *H2* was partially proved.

Conclusion

The conducted study, as a part of a broader scientific project named *Contemporary approaches to the teaching methodologys of mathematical education in early childhood,* on highlighting several factors of home environment that are key to children gaining mathematical experiences before they enter more formal preschool curriculum.

In our attempt to prove the first hypothesis, the results indicate a statistically significant correlation between the variables of financial situation in family, parental education, and owning the toys and playing materials that are stimulating for the cognitive (as well as mathematical) development. Furthermore, owning toys in home environment is significantly correlated with the educational level of both parents and with the similarity of their jobs with mathematics (for fathers). The first hypothesis was thus partially proved.

As for the second hypothesis, it was found that children's activities suitable for the acquisition of mathematical knowledge and skills (in families) significantly correlated with the variables of financial situation of the family, with father's educational level, and with the possession of (appropriate) toys at home for learning mathematics at an early age Thus, the second hypothesis was partially proved as well.

Based on these findings, and supported by other research, parental influence and home context are the first and necessary social and physical environment for foundations in informal mathematical experiences and development which have a potential to facilitate the process of much more formal guidance of children into the world of mathematics through preschool curriculum. On the other hand, home environment is a natural space for the social processes where young children actively enter into the mathematics culture and where they build their own math subculture as well. Therefore, some implications for mutual impacts and for interconnections of home and preschool curriculum may be highlighted.

As children's mathematical development is supported through direct and indirect activities and intentions of parents (LeFevre et al., 2009) and as it carries both formal and informal possibilities to learn math (Dunst et al., 2017), we suppose that connection and mutual influence of the two educational levels may be grounded more on these directions. Home environment, with its spontaneity and natural immersion into the culture of a broader community provides a safe place for children's participation and learning through the processes of socialisation. Children gain knowledge and experiences important for their, "survival" in a social context, where more abstract mathematical knowledge and operations are necessarily used in everyday situations, shaping "proto" mathematical functional literacy in natural context at an early age.

Given that, a pedagogical modeling of mathematics within the preschool curriculum in kindergarten can be suggested that is more compatible with cultural characteristics of family environment (based on idea of d'Ambrosio's mathematical modeling of activities into which elements and aspects of culture and community would be plunged, see more Rosa & Orey, 2011) and that can be one of broader pedagogical and teaching methodological strategies of integration of these two systems. That would provide a natural and smooth transition of children from one system to another, from a family environment into the preschool programme.

Another strategy can be focused more on strengthening parental knowledge on mathematics development in early years and opportunities for learning at home (especially for those with lower SES factors, see DeFlorio & Beliakoff, 2015). That means educating parents to use suitable math concepts for early learning, to communicate with children about math, do "mathematising" activities, use appropriate toys and materials in their homes, etc. The support for parents could be focused towards reducing their fear of failure, anxiety, and frustration (Lore et al., 2016).

At the same time, supporting parental pedagogical competences for playing with children in different environments through a less structured intervention programme can be favourable connection to play-based curriculum established on relations among children and on relations of children and adults. One of such programmes is *Project MathPack: Take-home bags* (Linder & Emerson, 2019), encouraging parents to organise and participate in activities based on playing with suitable math-related materials, interactions, and communication with children using open-ended questions, connecting everyday situations and home mathematics.

Whether it comes to intervention programmes that have been proved to be convenient and direct ways to strengthen parental skills in home environment, especially in conditions of low and medium SES status of the family, empowering and directly stimulating early learning in preschool programmes as well, (Gervasoni, 2017; Klein et al., 2008; Starkey et al., 2004; Streit-Lehmann, 2017) or to creation of mathematics education programme that is suitable for all children, which includes active participation of parents, talking, and reflecting about early mathematics as more indirect strategy for partnership with family, to be individualised by children's and family needs, preschool curriculum should start from children's learning in their home environment.

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ГДЈЕ ПОЧИЊЕ МАТЕМАТИЧКО ОБРАЗОВАЊЕ? ПОВЕЗИВАЊЕ ПРЕДШКОЛСКОГ КУРИКУЛУМА И ПОРОДИЧНОГ ОКРУЖЕЊА

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Резиме

У раду је представљена студија спроведена у оквиру ширег научног пројекта под називом Савремени приступи методици математичког образовања у раном дјетињству. Теоријска основа заснива се на претпоставци да породични контекст у којем дјеца одрастају, може утицати на рани математички развој и на њихова знања која она уносе у образовни систем. Емпиријска студија је реализована на узорку од 250 родитеља дјеце од шест година која су похађала јавну предшколску установу у Бањалуци. Студија доводи у везу активности које дјеца упражњавају код куће, са факторима везаним за социјално-економски статус породице (образовање родитеља, материјална статус и посао родитеља, посједовање играчака и материјала за игру код куће). Иако резултати истраживања дјелимично потврђују постављене хипотезе, у раду се истичу неке педагошко-методичке импликације везане за међусобне утицаје и повезаност предшколског курикулума, као визије стручне заједнице о математичком образовању у раном дјетињству, и породичног окружења, као првог простора потенцијално подстицајног за учење математике у рајранијем узрасту.

Кључне ријечи: *рано дјетињство, математичко образовање, породично окружење, предшколски курикулум, међусобни утицаји.*

ГДЕ НАЧИНАЕТСЯ МАТЕМАТИЧЕСКОЕ ОБРАЗОВАНИЕ? СВЯЗЫВАНИЕ ДОШКОЛЬНОГО КУРРИКУЛУМА И СЕМЕЙНОЙ СРЕДЫ

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Резюме

В статье представлено исследование, проведенное в рамках более широкого научного проекта под названием «Современные подходы к методологии математического образования в раннем детстве». Теоретическая основа базируется на предположении, что семейный контекст, в котором растут дети, может влиять на раннее математическое развитие и знания, которые они приносят в систему образования. Эмпирическое исследование было проведено на выборке из 250 родителей детей в возрасте шести лет, которые посещали государственное дошкольное учреждение в Баня-Луке. Исследование связывает деятельность, которую дети практикуют дома, с факторами, связанными с социально-экономическим статусом семьи (образование родителей, материальный статус и работа родителей, владение игрушками и игровыми материалами дома). Хотя результаты исследования частично подтверждают выдвинутые гипотезы, в статье подчеркиваются некоторые педагогически-методические последствия, связанные с взаимным влиянием и взаимосвязью дошкольного куррикулума, как видения профессионального сообщества математического образования в раннем детстве, так и семейной среды, как первого пространства, потенциально стимулирующего изучение математики в раннем возрасте.

Ключевые слова: *раннее детство, математическое образование, семейная среда, дошкольный куррикулум, взаимовлияние.*