Somolanji, I. i Bognar, L. (2008). Kreativnost u osnovnoškolskim uvjetima. *Život i škola, LIV*(19), 87-94.
Sullivan, P., Warren, E., White, P., & Suwarsono, S. (1998). Different forms of mathematical questions for different purposes: Comparing student responses to similar closed and openended questions. *Teaching Mathematics in New Times*, 572-579.
Torrance, E. P. (1965). *Rewarding Creative Behavior, Experiment in Classroom Creativity.* London: Prentice-Hall, INC.
Torrance, E. P. (1981). Creative teaching makes a Difference. In J. C. Gowan, J. Khatena, E. P. Torrance (Eds.) *Creativity: It is Educational Implications* (pp. 99-108). Hunt Publishing Company.
Treffinger, D. J. (et all.) (2002). Assessing Creativity: A Guide for Educators. Center for Creative Learning.
Wu, H. (2000). The Role of Open-ended Problems in Mathematics Education. *The Journal of Mathematical Behavior, 13*(1). https://doi.org/10.1016/0732-3123(94)90044-2

DURCHEVSKA GEORGIEVA Gabriela
Bureau for Development of Education, Skopje
CHONTEVA Zaneta
Bureau for Development of Education, Skopje
PALCEVSKA Simona
Ss. Cyril and Methodius University in Skopje
Faculty of Pedagogy "St. Kliment Ohridski", Skopje
Republic of North Macedonia

PRESCHOOL EDUCATION AND PARENT INVOLVEMENT IN CHILDREN'S ACTIVITIES AS DETERMINANTS OF STUDENTS' PERFORMANCE IN MATHEMATICS IN THE 2019 TIMSS SURVEY

Abstract: The paper uses the data obtained within the framework of the international research study for measuring the achievements of students in Mathematics and Natural Sciences (Trends in International Mathematics and Science Study) from the measurement carried out in 2019. The sample consists of a total of 3270 fourth grade students from 150 elementary schools in our country.

The paper aims to show the importance of preschool education and children's involvement in early educational activities for later progress in primary education. According to the results obtained from the study, it can be observed that students from the fourth grade have higher achievements in Mathematics if they attended kindergarten, when they had activities for the development of literacy and mathematics skills in kindergarten, or when their parents included them in activities for literacy and development of mathematics skills at an early age in the home.

The results also showed that there is a significant positive relationship between Home Resources for Learning and Early Activities. Therefore, future actions aimed at improving the achievements of our students in Mathematics on international tests should focus on creating conditions for increasing the years of stay of children in kindergarten, as well as on the time that teachers and parents devote to various activities for development. of numerical literacy and mathematical skills at home and in kindergarten.

Keywords: Preschool education and education; TIMSS; Student achievement

Introduction

TIMSS (The Trend in International Mathematics and Science Study) is an international study that measures trends in students' knowledge and abilities in mathematics and natural group subjects (physics, chemistry, biology, geography). IEA's TIMSS 2019 is the seventh assessment

cycle of TIMSS, the Trends in International Mathematics and Science Study. TIMSS 2019 was conducted at the fourth and eighth grades in 64 countries and 8 benchmarking systems. Inaugurated in 1995, TIMSS has been conducted every four years since, providing 24 years of trends in mathematics and science achievement.

In April and May 2019, TIMSS testing was conducted in Macedonia according to a certain methodological research study for measuring the achievements of students in Mathematics and Natural Sciences (Trends in International Mathematics and Science Study), where 3270 students from the fourth grade were tested. (in sample 3531 students) from 150 primary schools. The average age of tested students in RSM was 9.8 years. The results of the research show that the achievements in mathematics are below the international average:

Average achievements in Mathemathics	**Female**	**Male**
North Macedonia	472	472
International average	499	503

Source: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

Most countries had fewer than 10 percent of their fourth grade students performing at the Advanced level. The median percentages of students reaching the International Benchmarks were as follows: Advanced-7 percent, High-34 percent, Intermediate-71 percent, and Low-92 percent. Many TIMSS 2019 countries had more than 90 percent of their fourth grade students reaching the Low Benchmark, which can be considered a level of minimum proficiency internationally. In 6 countries, essentially all the students reached this benchmark-100 percent in Hong Kong SAR and Chinese Taipei, and 99 percent in Singapore, Korea, Japan, and the Russian Federation.

In North Macedonia according to Advanced Benchmark (625), High Benchmark (550), Intermediate Benchmark (475) and Low Benchmark (400) the following percentages were achieved compared to the international average values:[19]

[19] Low International Benchmark – Students have some basic mathematical knowledge. They can add, subtract, multiply, and divide one- and two-digit whole numbers. They can solve simple word problems. They have some knowledge of simple fractions and common geometric shapes. Students can read and complete simple bar graphs and tables. Students at this level are familiar with numbers into the thousands. They can order, add, and subtract whole numbers. They have some knowledge of multiplication and division involving two-digit numbers. They can solve one-step word problems and number sentences. They can recognize pictorial representations of simple fractions. Students can recognize basic measurement ideas. They can recognize and visualize common two- and three-dimensional geometric shapes. Students can read and complete simple bar graphs and tables.

Intermediate International Benchmark – Students can apply basic mathematical knowledge in simple situations. They can compute with three- and four-digit whole numbers in a variety of situations. They have some understanding of decimals and fractions. Students can identify and draw shapes with simple properties. They can read, label, and interpret information in graphs and tables. Students at this level demonstrate an understanding of four-digit whole numbers. They can add and subtract four-digit numbers in a variety of situations, including problems involving two steps. Students can multiply and divide three-digit numbers by a one-digit number. They can identify expressions representing simple situations. Students at this level can add and order decimals and work with non-unit fractions. Students can solve simple measurement problems such as identifying the appropriate metric unit for linear objects and volume. Students can solve addition and subtraction problems involving hours and minutes. They can identify and draw shapes with simple properties and relate two- and three-dimensional shapes. Students can read, label, and interpret information in graphs and tables.

High International Benchmark – Students apply conceptual understanding to solve problems. They can apply conceptual understanding of whole numbers to solve twostep word problems. They show understanding of the number line, multiples, factors, and rounding numbers, and operations with fractions and decimals. Students can solve simple measurement problems. They demonstrate understanding of geometric properties of shapes and angles. Students can interpret and use data in tables and a variety of graphs to solve problems. Students at this level apply conceptual understanding of whole numbers to solve two-step word problems. They can multiply two-digit numbers and solve

Average achievements in Mathemathics	Advanced Benchmark (625)	High Benchmark (550)	Intermediate Benchmark (475)	Low Benchmark (400)
North Macedonia	5	21	52	78
International average	7	34	71	92

Source: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

Results

In the following, some of the results of this large research are presented according to the previously determined methodological goals and objectives from which two hypotheses were structured according to the fact that previous analyzes determined that students who attended kindergarten show higher achievements in mathematics:

	Visiting kindergarten	3 or more years	2 years	1 year or less	Not attend
Average achievements in Mathemat.	North Macedonia	505	492	478	446
	International average	509	495	483	464

	Home resurces for Learning	Many resources	Some resources	Few resources
Average achievements in Mathemat.	North Macedonia	550	485	406
	International average	562	498	433

Source: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

Accordingly, two hypotheses are put forward:

H1. Visiting a kindergarten determines the development of Early Preschool Activities with parents, further Activities in schools and the Developed Skills of children which are factors and determinants for achievements in mathematics.

problems based on the number line, fractions, and decimals. They can find multiples of one-digit numbers and factors of numbers up to 30 and can round numbers. Students can identify an expression that represents a situation and can identify and use relationships in a well-defined pattern. Students can solve a variety of one-step measurement problems. They can classify and compare a variety of shapes and angles based on their properties. They demonstrate understanding of line symmetry and can recognize relationships between two- and three-dimensional shapes. Students can solve problems by interpreting data presented in tables, pie charts, pictographs, and line and bar graphs. They can compare data from two representations to draw conclusions.

Advanced International Benchmark -Students can apply their understanding and knowledge in a variety of relatively complex situations and explain their reasoning. Students can solve a variety of multistep word problems involving whole numbers and show an understanding of fractions and decimals. They can apply knowledge of two- and three-dimensional shapes in a variety of situations. Students can interpret and represent data to solve multistep problems. Students at this level can solve a variety of multistep word problems involving whole numbers. They can find more than one solution to a problem. Students can solve problems that show an understanding of fractions, including those with different denominators. They can order, add, and subtract one- and two-place decimals. Students can apply knowledge of two- and three-dimensional shapes in a variety of situations. They can draw parallel lines and solve problems involving area and perimeter of shapes. They can use a ruler to measure lengths of objects beginning or ending at a half-unit and read other measurement scales. Students can interpret and represent data to solve multistep problems. They can give a mathematical argument to support their solutions.

H2. Home Resources for Learning determines the development of Early Preschool Activities with parents, further Activities in schools and Children's Developed Skills which are factors and determinants of achievement in mathematics.

In order to have a clear picture of the research variables themselves that are structured in the hypotheses, in the research instruments according to TIMSS as a variable of further Activities in schools are stated as How Often\Read Books, Tell Stories, Sing Songs, Play Alphabet, Talk What Had Done, Book Discussion, Play Word Games, Write Letters Words, Read Aloud Signs, Counting Songs, Number Toys, Count Things, Game With Shapes, Building Blocks, Board Or Card Game, Write Numbers, Draw Shapes и Measure Or Weigh.

Children's developed skills in the instruments are listed as Recognize Letters, Read Some Words, Read Sentences, Read A Story, Write Letters, Write Name, Write Words, Count By Him-/Herself, Recog Written Numeral, Write Numbers, Simple Addition и Simple Subtraction.

Early preschool activities with parents are listed in the instruments as Early Literacy Activities Before School, Early Numeracy Activities Before School, Early Literacy and Numeracy Activities Before School, Early Literacy Tasks Beginning School, Early Numeracy Tasks Beginning School и Early Literacy and Numeracy Tasks Beginning School.

As for the first hypothesis that emphasizes that Visiting a kindergarten determines the development of Early Preschool Activities with parents, further Activities in schools and the Developed Skills of children which are factors and determinants for achievements in mathematics, in an analysis with multiple responses in Table 1 shows the following frequencies:

Table 1

Preschool_Attend and Early Activities with parents – Crosstabulation

			Early Activities			Total
			Often	**Sometimes**	**Never or almost never**	
Student Attended Preschool	Did Not Attend	Count	2265	3360	1035	1123
		% within	34.7%	42.7%	51.9%	
	1 Year or Less	Count	900	1050	240	371
		% within	13.8%	13.3%	12.0%	
	2 Years	Count	677	742	160	269
		% within	10.4%	9.4%	8.0%	
	3 Years or More	Count	2684	2718	560	1004
		% within	41.1%	34.5%	28.1%	
Total		**Count**	**6526**	**7870**	**1995**	**2767**

According to the TIMSS research, as stated, it resulted that a large number of children did not attend kindergarten, therefore, according to the percentages in Table 1, we conclude that the percentage of children with Often Early Activities who attended kindergarten dominate, and that over 41% of them who attended kindergarten more than 3 years, 10.4% with Often Early Activities that followed 2 years of kindergarten and 13.8% with Often Early Activities that followed until 1 year of kindergarten versus 34.7% with Often Early Activities that did not follow kindergarten. On the other hand, about 52% of the children did not show Often Early Activities at all from the group that did not attend kindergarten at all, compared to the smaller percentages of those who

attended kindergarten. This means that more Often Early Activities were shown by children who attended kindergarten compared to children who did not. According to the above results of TIMSS 2019, Often Early Activities have shown to be the determinant of higher achievements in mathematics. So, attending kindergarten develops Early Activities in children, which are one of the factors for higher results in mathematics. However, the large number of children who still do not attend kindergarten due to socio-technical conditions at the state level should not be overlooked.

Also for the second variable from the Activities in school hypothesis, Table 2 shows the following frequencies in an analysis with multiple responses:

Table 2

Preschool_Attend and Activities in school – Crosstabulation

			Activities in school			Total
			Often	Sometimes	Never or almost never	
Student Attended Preschool	Did Not Attend	Count	9573	8244	1820	1122
		% within	36.4%	43.3%	55.6%	
	1 Year or Less	Count	3556	2558	392	369
		% within	13.5%	13.4%	12.0%	
	2 Years	Count	2647	1806	249	267
		% within	10.1%	9.5%	7.6%	
	3 Years or More	Count	10542	6432	813	1000
		% within	40.1%	33.8%	24.8%	
Total		**Count**	**26318**	**19040**	**3274**	**2758**

According to the percentages in Table 2, we conclude that the percentages of children with Often Activities in school who have attended kindergarten dominate, and more than 40% of them have attended kindergarten for more than 3 years, 10.1% with Often Activities in school who have attended 2 years of kindergarten and 13.5% with Often Activities in school who attended up to 1 year of kindergarten compared to 36.4% with Often Activities in school who did not attend kindergarten. On the other hand, about 55.6% of the children did not show Never or almost never Activities in school from the group who did not attend kindergarten at all, compared to the smaller percentages of those who attended kindergarten. This means that children who attended kindergarten showed more Often Activities in school compared to children who did not. According to the above results of TIMSS 2019, Often Activities in school showed that they are the determinant for higher achievements in mathematics. So, attending kindergarten develops Often Activities in school among children, which are one of the factors for higher results in mathematics.

Also for the second variable from the hypothesis developing Skills, Table 3 in an analysis with multiple responses shows the following frequencies:

Table 3

Preschool_Attend and Skills – Crosstabulation

			Skills				Total
			Very well	**Moderately well**	**Not very well**	**Not at all**	
Student Attended Preschool	Did Not Attend	Count	2779	2079	1612	1104	1121
		% within	37.9%	39.0%	43.1%	48.7%	
	1 Year or Less	Count	1033	691	470	281	368
		% within	14.1%	13.0%	12.6%	12.4%	
	2 Years	Count	738	500	388	164	267
		% within	10.1%	9.4%	10.4%	7.2%	
	3 Years or More	Count	2792	2060	1274	718	999
		% within	38.0%	38.6%	34.0%	31.7%	
Total		**Count**	**7342**	**5330**	**3744**	**2267**	**2755**

According to the percentages in Table 3, we conclude that the percentages of children with the development of Skills Very well who attended kindergarten dominate, namely 38% of them who attended kindergarten for more than 3 years, 10.1% with the development of Skills Very well who attended 2 years of kindergarten and 14.1% with developing Skills Very well who followed up to 1 year of kindergarten compared to 37.9% with developing Skills Very well who did not follow kindergarten. On the other hand, about 48.7% of the children did not show any development of Skills Not at all from the group who did not attend kindergarten at all, compared to the smaller percentages of those who attended kindergarten. This means that children who attended kindergarten showed more development of Skills compared to children who did not attend. Developing Skills according to the above TIMSS 2019 results have shown to be the determinant of higher achievement in mathematics. So, attending kindergarten develops skills in children, which are one of the factors for higher results in mathematics.

According to the three analyzes of the variables that are part of the first hypothesis, we state that the first hypothesis where it is stated that Visiting a kindergarten determines the development of Early Preschool Activities with parents, further Activities in schools and the Developed Skills of children which are factors and determinants for achievements in mathematics, it is **confirmed**.

As for the second hypothesis, where it is emphasized that Home Resources for Learning determines the development of Early Preschool Activities with parents, further Activities in schools and Children's Developed Skills which are factors and determinants of achievement in mathematics, that means for the three variables (Early Preschool Activities, Activities in schools, Developed Skills) which according to TIMSS 2019 are determinants for higher achievements in mathematics, for its interpretation in the following will be analyzed to determine if these variables develop in children depending on Home Resources for Learning.

As for Home Resources for Learning and Early Activities, Table 4 shows small positive correlation coefficients and therefore R= .353 .286 .334 .175 .226 .212 with sig=.000 ($p<0.01$), with in other words, we state that the increase in Home Resources for Learning results in an increase in Early Activities among children. But the small positive correlation coefficient also shows the scarcity of Home Resources for Learning in households in Macedonia.

Table 4
Correlation between Home Resurces for Learning and Early Activities

		Early Literacy Activities	Early Numeracy Activities	Early Literacy and Numera	Early Literacy Tasks	Early Numeracy Tasks	Early Literacy and Numera	Home Resources for Learning
Home Resources for Learning	Pearson Correlation	.353**	.286**	.334**	.175**	.226**	.212**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	
	N	2740	2731	2741	2691	2734	2765	2780

Also for the second variable from the Home resources and Activities in school hypothesis, Table 5 shows the following frequencies in an analysis with multiple responses:

Table 5
Home_resurces and Activities in school – Crosstabulation

			Activities in school			Total
			Often	Sometimes	Never or almost never	
Home Resources for Learning	Many Resources	Count	2377	1058	124	198
		% within	9.0%	5.5%	3.8%	
	Some Resources	Count	21454	15026	2114	2193
		% within	81.5%	78.8%	65.1%	
	Few Resources	Count	2479	2985	1007	370
		% within	9.4%	15.7%	31.0%	
Total		**Count**	**26310**	**19069**	**3245**	**2761**

According to the percentages in Table 5, we find that the percentages of children with Often Activities in school who have Some Resources and that over 81% of them dominate, as opposed to others with insignificant percentages of Many and Few Resources. Also, the other high percentages of cases where children Sometimes or Never or almost never did not show Activities in school are in the group of Some Resources, which means that children show or not Activities in school independently of Home resources.

Also for the second variable from the Home resources and Skills hypothesis, Table 6 shows the following frequencies in an analysis with multiple responses:

Table 6
Home_resource and Skills – Crosstabulation

			Skills				Total
			Very well	Moderately well	Not very well	Not at all	
Home Resources for Learning	Many Resources	Count	613	411	210	141	198
		% within	8.3%	7.7%	5.7%	6.4%	
	Some Resources	Count	6077	4341	2905	1486	2189
		% within	81.9%	81.6%	78.3%	67.2%	
	Few Resources	Count	731	566	595	583	375
		% within	9.9%	10.6%	16.0%	26.4%	
Total		**Count**	**7421**	**5318**	**3710**	**2210**	**2762**

According to the percentages in Table 6, we find that the percentages of children with Very well Skills who have Some Resources dominate, over 81% of them, as opposed to others with insignificant percentages of Moderately, Not very well, Not at all. Also, the other high percentages of cases where Moderately, Not very well, Not at all children showed or did not show Skills are in the group of Some Resources, which means that children show or not Skills independently of Home resources.

According to these results, we conclude that Home Resources for Learning and Early Activities show a small positive relationship compared to Home resources and Activities in school, and Home resources and Skills, which show independence according to the percentages with multiple responses, therefore, we conclude that the second hypothesis is **partially sustainable**.

Conclusion and Recommendations

Based on the results shown, we conclude that more Often Early Activities were shown by children who attended kindergarten compared to children who did not, then that more Often Activities in school were shown by children who attended kindergarten compared to children who did not, and that children showed more development of Skills who attended kindergarten versus children who did not. According to the above results of TIMSS 2019, Often Early Activities, Often Activities in school and the development of Skills have shown that they are the determinant for higher achievements in mathematics.

As for Home Resources for Learning and Early Activities, we find that the increase in Home Resources for Learning results in an increase in Early Activities among children, then that children show or not Activities in school independently of Home resources and that children show or not Skills independently of Home resources.

According to these results, policies in the educational process should be structured in the direction of introducing mandatory preschool education for children aged 4 to 6 years. Then, to connect the skills acquired in the pre-school period with the school period. To improve the quality and access to preschool institutions for all children, especially for children from vulnerable groups (children from rural areas, children with disabilities and developmental disabilities, children from marginalized groups). To work on raising the awareness of parents about the importance of RUR on the later achievements of students in mathematics. To involve parents in activities for early learning and development of language and mathematical competences. To provide training for parents on various activities with children in the family during the preschool period, significant

for the educational achievements of their children. To encourage parents with a lower level of education to participate in the realization of various educational activities in the home during the preschool period. Organizing various forms of support for parents with lower socio-economic status that would include donating funds, toys and educational materials.

Literature

IEA's Trends in International Mathematics and Science Study TIMSS 2019 Downloaded from http://timss2019.org/download

Findings from the TIMSS 2019 Problem Solving and Inquiry Tasks (2021) Ina V.S. Mullis, Michael O. Martin, Bethany Fishbein, Pierre Foy, and Sebastian Moncaleano

TIMSS 2019 International Results in Mathematics and Science (2020) Ina V.S. Mullis, Michael O. Martin, Pierre Foy, Dana L. Kelly, and Bethany Fishbein

TIMSS 2019 International Database and User Guide (2021) Bethany Fishbein, Pierre Foy, and Liqun Yin

TIMSS 2019 Encyclopedia: Education Policy and Curriculum in Mathematics and Science (2020) Dana L. Kelly, Victoria A.S. Centurino, Michael O. Martin, and Ina V.S. Mullis (Eds.)

Methods and Procedures: TIMSS 2019 Technical Report (2020) Michael O. Martin, Matthias von Davier, and Ina V.S. Mullis (Eds.)

TIMSS 2019 Assessment Frameworks (2017) Ina V.S. Mullis and Michael O. Martin (Eds.)

GALEVSKA Elena
Institute for Economic Democracy, Ljubljana, Slovenia

OPINIONS OF STUDENTS TOWARD VACCINATION

Abstract: Ever since the global media fuss about vaccination in 2017, and especially during the recent pandemic, the whole world is questioning its benefits. Some people are second-guessing whether vaccinations are good for public health or actually causing additional illnesses. After this populist news got public, different institutions started recording a decline in the number of people around the globe getting vaccinated per season.

Due to the recency and relevance of the topic, the purpose of this work is to define the most common opinion regarding vaccination among youth and conclude whether their peers are successful in influencing it or not. The conclusions are drawn from desk research, by examining secondary sources, as well as a survey, where the primary data gathered through a questionnaire is used to reject or confirm the hypotheses. The sample consists of 109 respondents, which were non-randomly selected from the target population.

The main findings are that majority of the students have a positive outlook on vaccines (both mandatory and optional), students would be more prone to get vaccinated when the vaccines are free, and they believe that getting the mandatory vaccines is more important than getting the optional vaccines.

Keywords: Vaccination, Students, Opinions

Introduction

The purpose of the study was to examine the attitudes of young people toward vaccination. The topic of the study was chosen due to its relevance given the anti-vaccine movements taking place since 2017. Societies need to take action against these movements as having more and more people refusing to get the mandatory vaccines will eventually lead to losing herd immunity. More specifically, once the majority of people (80% and more) are vaccinated against a virus, the likelihood of it spreading and affecting the non-vaccinated part of the population is significantly lower, therefore there is a positive spillover effect also for those that didn't get a vaccine.