

EVALUATION OF MOTOR ACHIEVEMENTS IN PHYSICAL EDUCATION IN LOWER ELEMENTARY SCHOOL GRADES

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Abstract

This paper aims to determine the levels of motor achievements of lower elementary school¹ students and to offer ways and procedures for evaluating motor achievements in lower elementary school teaching. The sample consisted of 154 lower elementary school students. The sample of variables consisted of five newly constructed tests for biotic motor knowledge: the polygon of biotic motor knowledge for overcoming obstacles, the polygon of biotic motor knowledge for mastering space, the polygon of biotic motor knowledge for overcoming resistance, the polygon of biotic motor knowledge for manipulating objects with the hand, and the polygon of biotic motor knowledge for manipulating objects with the foot. The tests were designed so that all elements were known to the students in advance, and the complexity of the polygon was adjusted to the students' age. Each student completed each polygon twice, and both results were measured and recorded. The results in the described test measurements were processed by a standard statistical procedure to obtain basic statistical indicators. The test-retest method established a correlation between the two results of the same test. At-test revealed differences in all entities between girls and boys by test and age. The frequencies show the successes of each class separately. During data processing, a difference was found between students by age and sex. It was concluded that there is a visible statistical difference between students of different ages. The older the students, the less time they need to complete the polygon. A difference between boys and girls is also visible, i.e., a difference by sex. The boys achieved better results in the polygons of biotic motor knowledge for overcoming obstacles, mastering space, manipulating objects with the hand, and manipulating objects with the foot. The girls achieved a better result only in the polygon of biotic motor knowledge for overcoming resistance. By studying the results of students regarding the grade, this paper offers criteria to help in the evaluation of their results, i.e., teachers' assessment.

Key words: motor achievements, polygons, evaluation, age, sex.

Introduction

The period of primary education is a significant period in a child's development. During this period, children mature, meet new friends, discover new interests, and change mentally and physically. During primary education, the teacher is the person who guides the students on the path of their development. The teacher, along with the family, spends most of the time during the day with the students and will best notice the changes that occur in them.

With regards to physical development, childhood is the period in which physical development is most apparent, and when a person changes and develops the most. It is important to emphasize that not all children have the same level of physical development regarding age, do not have the same competencies for physical activities or the same interests. Today, we are witnessing pronounced changes in body measures in young people, and they are most noticeable in developmental changes (Kondrič, Mišigoj-Duraković and Metikoš, 2002). However, the teacher's task is to get to know each of his students, the environment in which they are growing up, and their interests.

The emphasis in modern schooling is on the partnership of the school, students, and parents.

When a child becomes the subject of education, the teacher, in partnership with the parents, will be able to discover his talents and interests and guide him on the path to success. In order to do this, the teacher must plan the lessons well and monitor each student regularly. Regular monitoring is of great importance in the teaching of Physical Education. From the first grade, morphological characteristics are specially monitored, especially body height and body weight. However, it is essential to monitor functional abilities, motor, and cognitive abilities, conative traits, and sociological characteristics.

The subject area Kinesiological theoretical and motor knowledge, emphasizes the adoption, improvement, and application of various kinesiological theoretical and motor knowledge and skills, the mastery of which achieves a certain level of student competency, including motor literacy. The subject area Morphological characteristics, motor, and functional abilities focuses on the human body and its characteristics.

Regular monitoring and verification are most important for monitoring progress in this area. All these forms of verification must be regularly recorded and analyzed. It is mandatory to

¹In the Republic of Croatia, lower elementary schooling covers grades one through four.

familiarize the students with the results because then teachers' and students' full commitment will be visible (Pejić, 2005).

Students acquire motor skills during Physical Education and apply them during class, but also in everyday situations outside of school. In other words, the quality of knowledge, even motor knowledge, is manifested in a specific fund of knowledge and the students' ability to apply the acquired knowledge at the right time and in the most rational way (Findak, 2003).

When the motor abilities are concerned, they are in the function of motor achievements when they are utilized in the right moment. It is important that they contribute to raising the final effect of a particular exercise, element, or task.

The development of anthropological characteristics will enable better progress in acquiring motor knowledge and, ultimately, motor achievements. Through regular work and impact on all abilities and their combination with traits and characteristics, we can expect better results in motor knowledge and motor achievements. Basic motor skills in children are created and developed by natural forms of movement that are contained in walking, running, rolling, rolling, jumping, skipping, shooting, throwing, and catching (Sayre and Gallager, 2000). Improving motor knowledge and skills will improve motor achievements that manifest as the exerciser's ability to perform an element or exercise.

Significant factors for the child's quality development are kindergartens and schools and other forms outside of family education that can offer opportunities to eliminate the negative consequences of modern life (Trajkovski, 2011). The task of the whole society and the state is to provide real and accurate information about the great importance of regular exercise and provide conditions and expand opportunities for safe engagement in various physical activities (Vuori, 2004).

The topic of the complexity of motor achievements and the very importance of physical exercise was the guiding principle for writing this paper. For this research, polygons with elements of natural forms of movement were designed that would show the level of adoption of students' motor achievements from the first to the fourth grade of elementary school. This research aims to determine the levels of motor achievement of lower elementary school students and offer ways and procedures for evaluating motor achievements (evaluation criteria) in homeroom teaching and determining differences by age and sex.

Methods

The sample consisted of 154 students from the first to the fourth grade of the Elementary School "Pehlin." The participants were tested during Physical Education classes. They were divided into groups according to the class they attended in the 2019/2020 school year, just before the Covid-19 pandemic outbreak.

The sample of variables consisted of five tests to verify biotic motor knowledge:

- Polygon of biotic motor knowledge for overcoming obstacles
- Polygon of biotic motor knowledge for mastering space
- Polygon of biotic motor knowledge for overcoming resistance
- Polygon of biotic motor knowledge for manipulating objects with the hand
- Polygon of biotic motor knowledge for manipulating objects with the foot

The tests were designed and adapted to the students of homeroom teaching. Each student completed the polygon twice, and both results were measured and recorded. The polygons are shown in Figures 1-5.

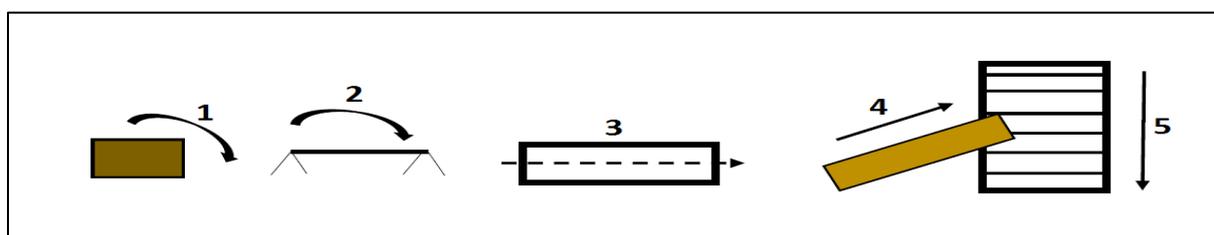


Figure 1. Polygon of biotic motor knowledge for overcoming obstacles (POLYGONOBSTACLES).

A Swedish bench is placed in the gym hall from which the student should jump, run to a low obstacle, jump over the obstacle, slip through the frame of the Swedish bench, cross the set slope, and go down the Swedish ladder.

The time is measured in tenths of a second from the start sign to the moment the student touches the ground with his feet.

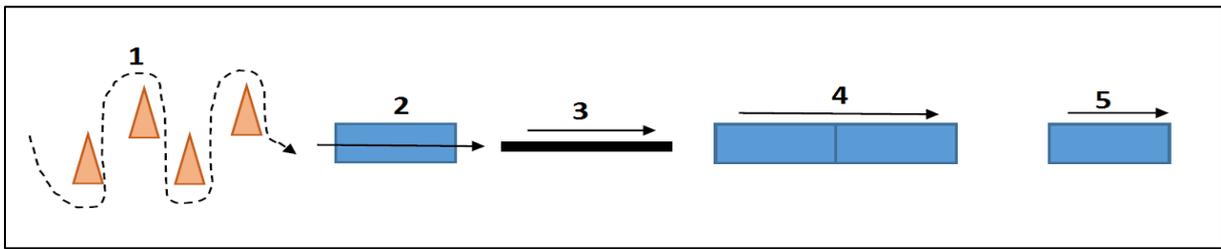


Figure 2. Polygon of biotic motor knowledge for mastering space (POLYGONSPACE).

The student runs from the starting line to the cones, goes around them, continues to run to the mat on which he rolls, walks on a straight line (drawn on the ground), crawls over the placemats, and continues to the mat on which he rolls.

The time is measured in tenths of a second from the start sign to the moment the task is completed.

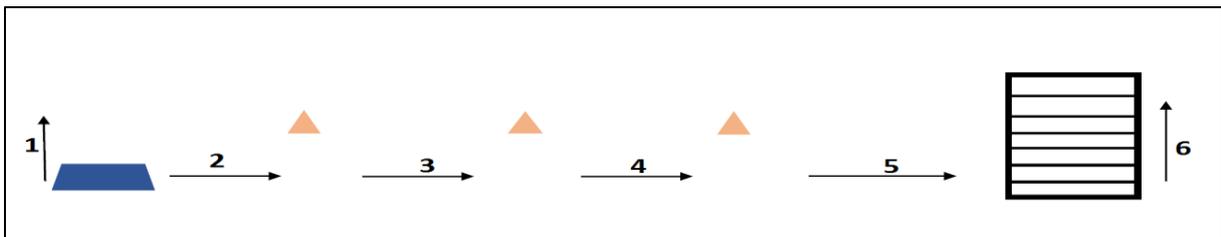


Figure 3. Polygon of biotic motor knowledge for overcoming resistance (POLYGONRESISTANCE).

On the start line, the student picks up a small mat and carries it to the set cone, lowers it to the ground, and pushes it on the ground to the second cone, turns and pulls the mat backward to the third cone, turns and moves on all fours to the Swedish ladder.

He grabs a bar with his hands, raises his knees to his chest, and jumps to the ground. Time is measured in tenths of a second from the start of the task to the moment the student touches the ground after jumping off the Swedish ladder.

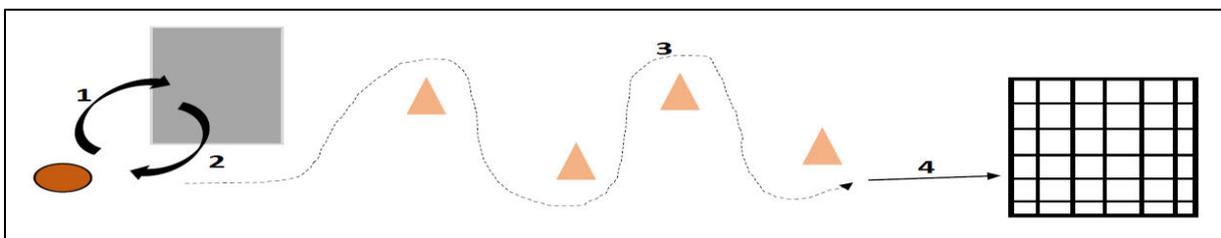


Figure 4. Polygon of biotic motor knowledge for manipulating objects with the hand (POLYGONHAND).

The student throws the ball from the set place into the wall, catches it with both hands, and leads the ball around the cones. When he passes the cones, he throws the ball into the mini indoor football goal post.

The time is measured in tenths of a second from the start sign to the moment the ball enters the goal.

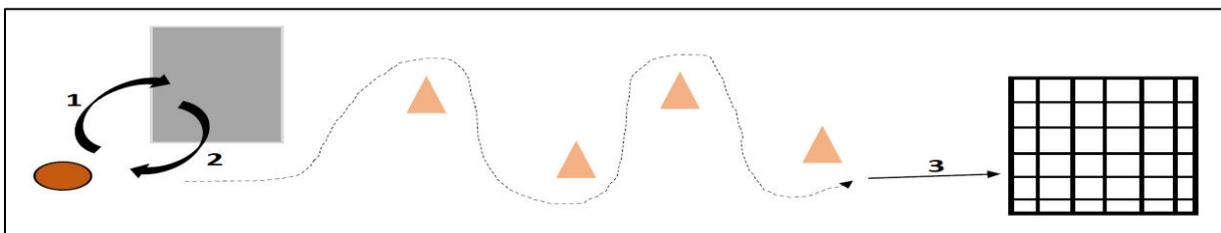


Figure 5. Polygon of biotic motor knowledge for manipulating objects with the foot (POLYGONFOOT).

The student shoots the set target from the starting line, stops the bounced ball with his foot, and leads the ball around the set cones. At the end, he throws the ball at the mini indoor football goal post. The time is measured in tenths of a second from the start sign to the moment the ball enters the goal.

The results in the described test measurements were processed using a standard statistical procedure to obtain basic statistical indicators. Arithmetic mean (AS), standard deviation (SD), minimum (MIN), maximum (MAX), asymmetry measures (SKEW), and flatness measures (KURT) were calculated. The test-retest method established a correlation between the two results of the same test. At-test revealed differences in all entities between girls and boys by test and age. The frequencies show the successes of each class separately.

Results and discussion

Test reliability was determined with the test-retest method. Pearson's correlation coefficient for the

polygon of biotic motor knowledge for overcoming obstacles is 0.915 and indicates a high correlation. Pearson's correlation coefficient for the polygon of biotic motor knowledge for mastering space is 0.856; for the polygon of biotic motor knowledge for mastering resistance, it is 0.715, so the correlation is very high in both tests.

Pearson's correlation coefficient is 0.541 in biotic motor skills for hand manipulation, and for foot manipulation, it is 0.526, so a moderate correlation was observed in both tests. A slightly lower correlation in object manipulation is probably because a significantly better result was achieved in the second attempt because the children were more confident during the second performance.

Zjačić-Ljubičić and Trajkovski (2020) determined better results in the second attempt in the polygon for manipulating the ball with hands and feet in preschool children, with the boys showing significantly better results than the girls.

Table 1 shows the results of the descriptive statistics for each grade.

Table 1. Descriptive statistics for each grade (AS = arithmetic mean; SD = standard deviation).

VARIABLE	1st GRADE (N=37) AS±SD	2nd GRADE (N=39) AS±SD	3rd GRADE (N=39) AS±SD	4th GRADE (N=39) AS±SD
Poligon obstacles 1	17.48±5.01	16.39±4.41	19.36±7.72	14.59±3.22
Poligon obstacles 2	15.99±4.5	14.31±3.24	17.24±6.87	13.40±2.69
Poligon space 1	16.11±2.26	15.39±2.82	18.09±4.07	14.35±2.37
Poligon space 2	14.98±1.98	14.17±2.56	16.46±3.51	13.22±2.22
Poligon resistance 1	28.6±5.5	23.27±7.04	23.0±6.3	22.99±5.55
Poligon resistance 2	24.12±5.27	20.13±3.84	20.9±6.05	18.97±3.21
Poligon hand 1	20.98±8.45	25.16±9.0	17.14±9.44	17.11±8.72
Poligon hand 2	18.69±5.27	20.14±9.04	14.83±4.41	13.64±6.06
Poligon foot 1	27.43±9.38	18.83±4.58	22.46±9.34	15.77±4.59
Poligon foot 2	28.22±10.83	18.55±4.4	23.79±11.54	14.44±3.43

In the polygon overcoming obstacles, first-grade students achieved an average result of 17.48 seconds in the first measurement and 15.99 seconds in the second measurement. Second-grade students achieved an average score of 16.38 seconds in the first and 14.31 seconds in the second measurement. Third-grade students achieved 19.36 seconds in the first and 17.24 seconds in the second measurement. Fourth-grade students achieved 14.59 seconds in the first and 13.40 seconds in the second measurement. All students achieved a better result in the second measurement.

In the polygon overcoming space, first-grade students achieved an average score of 16.11 seconds in the first measurement and 14.98 seconds in the second. Second-grade students achieved a result of 15.39 seconds in the first and 14.17 seconds in the second measurement. Third-grade students achieved a result of 18.09 seconds in the first and 16.46 seconds in the second measurement.

Fourth-grade students achieved a result of 14.35 seconds in the first and 13.22 seconds in the second measurement. In this polygon, the fourth-grade students once again achieved the best results.

In the polygon resistance, first-grade students achieved an average of 28.6 seconds in the first measurement and 24.12 seconds in the second measurement. Second-grader students achieved 23.27 seconds in the first and 20.13 in the second measurement. Third-grader students achieved a result of 23 seconds in the first and 20.9 seconds in the second measurement. Fourth-grade students achieved a score of 22.99 seconds in the first and 18.97 in the second measurement. It is evident that the fourth-grader students achieved the best results in this polygon as well.

The polygon hand manipulation results indicate that first-grade students achieved an average result of 20.98 seconds in the first measurement and 18.69 seconds in the second measurement.

Second-grade students scored 25.16 seconds in the first and 20.14 in the second measurement. Third-grade students achieved a result of 17.14 seconds in the first and 14.83 seconds in the second measurement. Fourth-grade students scored 17.11 seconds in the first and 13.64 seconds in the second measurement. Fourth-grade students, once again, achieved the best results.

Analyzing the polygon foot manipulation results, the first-grade students achieved an average result of 27.43 seconds in the first measurement and 28.22 seconds in the second measurement. Second-grade students achieved a result of 18.83

seconds in the first and 18.55 seconds in the second measurement. Third-grader students achieved a result of 22.46 seconds in the first and 23.79 seconds in the second measurement. Fourth-grade students achieved a result of 15.77 seconds in the first and 14.44 seconds in the second measurement. The obtained results indicate that the fourth-grade students achieved the best results in this polygon as well.

Differences by age were determined using the t-test for independent samples and are shown in Table 2.

Table 2. Discriminant analysis (p - error, R^2 - squared multiple correlations).

Wilks's lambda=0.31 F (15.392) = 13.818 p<0.0000						
VAR	WILKS'S LAMBDA	PARTIAL LAMBDA	F-VALUE	p	TOLERANCE	R ²
OBST.	0.33	0.94	3.05	0.031*	0.40	0.60
SPACE	0.38	0.82	10.13	0.000*	0.46	0.54
FOOT	0.48	0.65	25.71	0.000*	0.67	0.33
HAND	0.39	0.80	12.19	0.000*	0.74	0.26
RESIST.	0.40	0.77	13.97	0.000*	0.55	0.45

A discriminant analysis was performed between five independent test variables in which the arithmetic mean of the two obtained results and the grouping variables of grades were taken from each test. Age differences were made for all four grades. From the obtained results, we observe that there is a significant difference between the grades in each test. The best time was achieved by the fourth-grade students, followed by the second- and first-grade students. Slightly worse results were achieved by third-grade students, which suggests that teachers' work influences the result. Korica and Vidaković (2007) performed several throwing abilities tests. The research aimed to determine the developments of the curve of some motor

achievements in throwing and answer whether boys and girls differ in the stated motor achievements. The authors explain that, at that age, boys are somewhat stronger and show greater interest in this form of activity.

Poljančić and Trajkovski (2016) state that dance shapes the individual in several ways. Dance is a poly-structural activity that affects the level of motor task mastery. The authors concluded that all students involved in dance have progressed and that it is clear that this activity is indispensable for children of that age. Table 3 shows the results of the t-test and the determined differences by sex.

Table 3. T-test. Differences in all entities between boys and girls by test (AS M – arithmetic mean of boys, AS F – arithmetic mean of girls, t – t-values, df –degrees of freedom, e– error).

TEST	AS M	AS F	t	df	e
OBST.	14.78	17.88	-3.921	152	0.000*
SPACE	14.46	16.55	-4.622	152	0.000*
RESIST.	22.48	21.65	0.792	152	0.430
HAND	17.58	19.27	-1.418	152	0.158
FOOT	19.28	23.59	-3.431	152	0.001*

The obtained results indicate significant differences. In the field of biotic motor knowledge for overcoming obstacles, the arithmetic mean for boys is 14.78 seconds, and for girls, it is 17.88 seconds. This result shows that boys completed this polygon on average more than 3 seconds faster than girls. In the polygon of biotic motor knowledge for mastering space, the arithmetic mean for boys is 14.46 seconds, and for girls, it is 16.55 seconds. The boys achieved an average better result in this test as well, and they passed the polygon over 2 seconds faster than the girls. In the biotic motor knowledge test for overcoming obstacles, the boys achieved an average time of

22.48 seconds and girls in 21.65 seconds. This is the only polygon in which the girls achieved an average faster time of 83 hundredths of a second. In the polygon of biotic motor knowledge for manipulating objects with the hand, the boys' arithmetic mean is 17.58 seconds and 19.27 seconds for the girls. The boys achieved an average better time of 1.69 seconds.

In the biotic motor knowledge polygon for manipulating objects with the foot, boys achieved an average time of 19.28 seconds and girls of 23.59 seconds. The boys achieved an average better time of 4.31 seconds.

RESULT	OBST.		SPACE		RESIST.		HAND		FOOT	
	F	%	F	%	F	%	F	%	F	%
BEST	4	10.81	1	2.70	2	5.41	5	13.51	4	10.81
GOOD	23	62.16	5	13.51	20	54.05	13	35.14	8	21.62
AVERAGE	7	18.92	16	43.24	9	24.32	13	35.14	13	35.14
BAD	1	2.70	10	27.03	4	10.81	5	13.51	7	18.92
WORST	2	5.41	5	13.51	2	5.41	1	2.70	5	13.51
TOTAL	39	100	37	100	37	100	37	100	37	100

Table 9 shows the frequencies of first-grade students' results. It is observable that four students achieved the best result in the polygon of biotic motor knowledge for mastering obstacles and that they make up 10.81% of the first-grade population. A total of 23 students are included in the category of good results, and they make up 62.16% of the grade. Seven students also fall into the category of average results, and they belong to 18.92%. Only one student achieved a poor result, and he makes up 2.70%. In the end, two students achieved the worst result and make up 5.41% of first grades. In total, 39 first graders took part in this polygon. Looking at the success in the polygon of biotic motor knowledge for mastering space in the first grades, it is evident that only one student is the best, which makes up 2.70% of the first grades. A total of five students performed well, and they make up 13.51% of that population. The average success category includes 16 students, and they make up 43.24% of the first-grade population. Ten students achieved poor results, which is 27.03%. Five first-grade students achieved the worst success, and they make up 13.51%. Thirty-seven students took part in this polygon. In the polygon of biotic motor knowledge for overcoming resistance, 5.41% of students belong to the category with the best result, i.e., two students. The percentage of 54.05% of the total student population belongs to the category with good results and consists of 20 students.

Nine students completed the test with average success, i.e., 24.32% of the population. A total of four students achieved poor results and make up 10.81% of the population. The worst success was achieved by two students who make up 5.41% of the population. A total of 37 students took part in this polygon. A total of five students completed the polygon of biotic motor knowledge for manipulating objects by hand with the best success, and they make up 13.51% of that student population. Thirteen students achieved good results and average results, and make up 35.14% of the population, respectively. Five students achieved poor results and make up 13.51% of the population, while only one student pertains to the category of worst results and makes up 2.70% of the total population of first graders. The total number of students who participated in this polygon is 37. Four students completed the polygon of biotic motor knowledge for manipulating objects with the foot with the best result, which is 10.81% of the total population of first graders. Eight students, i.e., 21.62%, achieved good results. A total of 13 students achieved an average result, which includes 35.14% of the student population. Seven students achieved poor results, amounting to 18.92%, and the worst results were achieved by five students, i.e., 13.51%. The number of students who participated in this polygon is 37.

RESULT	OBST.		SPACE		RESIST.		HAND		FOOT	
	F	%	F	%	F	%	F	%	F	%
BEST	9	23.08	4	10.26	8	20.51	1	2.56	5	12.82
GOOD	23	58.97	16	41.03	27	69.23	13	33.33	8	20.51
AVERAGE	6	15.38	12	30.77	3	7.69	20	51.28	16	41.03
BAD	0	0.00	6	15.38	0	0.00	4	10.26	6	15.38
WORST	1	2.56	1	2.56	1	2.56	1	2.56	4	10.26
TOTAL	39	100	39	100	39	100	39	100	39	100

Table 10 shows that 39 second-grade students took part in each polygon. In the polygon of biotic motor knowledge for mastering obstacles, nine students achieved the best result, making 23.08% of the total examined population. 58.97% of students achieved good results, which is a total of 23 students. The category of average success includes six students, i.e., 15.38% of the population. The results show that no student achieved a bad result and that only one achieved the worst result, which is 2.56% of the total number of students. Four students achieved the best success in the polygon of biotic motor knowledge for mastering space, which makes up 10.26%. Sixteen students were placed in the category with good results, and they make up

41.03%. Twelve students with an average result make up 30.77% of the total second-grade population. Six students completed the test with a poor result or 15.38%, and only one student achieved the worst result, which makes up 2.56% of the population. Eight students, who make up 20.51% of the examined second-grade students' total population, achieved the best success in the polygon of biotic motor knowledge for overcoming resistance. As many as 27 students achieved good results and make up 69.23%. A total of three students passed the test with an average score and make up 7.69%. In the surveyed second-grade population, there are no students who achieved a poor result in this polygon, but one student achieved the worst result, which makes up

2.56% of the student population. One student completed the polygon of biotic motor knowledge for manipulating objects with the hand with the best success, which is 2.56% of the surveyed population. A total of 13 students achieved good results, which makes up 33.33% of the population. A total of 20 students fall into the category of students with an average result and make up 51.28%. Four students achieved a poor result, which makes up 10.26% of the population. Again, only one student achieved the worst result, which makes up 2.56% of the total population.

In the polygon of biotic motor knowledge for manipulating objects with the foot, a total of five students achieved the best result and make up 12.82% of all second-grade students.

A total of eight students achieved good results and belong to 20.51% of the student population. Students who achieved an average result make up 41.03% of second-grade students, i.e., 16 of them. Six students achieved poor results, which is 15.38%, and four students achieved the worst result, which is 10.26%.

RESULT	OBST.		SPACE		RESIST.		HAND		FOOT	
	F	%	F	%	F	%	F	%	F	%
BEST	15	38,46	5	12,82	5	12,82	7	17,95	7	17,95
GOOD	16	41,03	13	33,33	16	41,03	24	61,54	17	43,59
AVERAGE	6	15,38	15	38,46	11	28,21	4	10,26	8	20,51
BAD	1	2,56	3	7,69	2	5,13	2	5,13	5	12,82
WORST	1	2,56	3	7,69	1	2,56	2	5,13	2	5,13
TOTAL	39	100	39	100	39	100	39	100	39	100

Table 11 shows that a total of 39 third-grade students participated in the measurements. In the polygon of biotic motor knowledge for mastering obstacles, 15 students achieved the best result, who make up 38.46% of the population of third-grade students who took part in the measurements. Sixteen students achieved good results and make up 41.03%. Only six students are classified in the group of average results, which makes up 15.38%. One student entered the category with a poor result and one the category with the worst performance, and they each make up 2.56% of the student population.

achieved the best result, and they make up 12.82% of the examined third-grade population. There are 16 students with a good result, and they make up 41.03% of the population. There are 11 students with an average result, which makes up 28.21% of the total population. In total, there are two students with a poor result, i.e., 5.13%, and one student with the worst result, i.e., 2.56%. Seven students completed the polygon of biotic motor knowledge for manipulating objects with the hand with the best result and make up 17.95% of the student population. The number of students with good results is 24, or 61.54%. Four students achieved an average result, which makes up 10.26% of the population. Two students fall under the category of poor results and two in the category of the worst results, which makes up 5.13%, respectively. Seven students achieved the best result in the polygon of biotic motor knowledge for manipulating objects with the foot, and they make up 17.95% of the population. There are 17 students who achieved good results, and they make up 43.59%. There are eight students with an average result or 20.51%. A poor result was achieved by five students, i.e., 12.82%, and the worst by two students, i.e., 5.13%.

Five students completed the polygon of biotic motor knowledge for mastering space with the best success and they make up 12.82%. Thirteen students achieved good results and belong to 33.33% of the total number of students. There are 15 students with average results and make up 38.46% of the population. Three students were included in the category of poor results as well as three students who were included in the category of the worst results, or 7.69% of the population, respectively. In the polygon of biotic motor knowledge for overcoming resistance, five students

RESULT	OBST.		SPACE		RESIST.		HAND		FOOT	
	F	%	F	%	F	%	F	%	F	%
BEST	2	5,13	5	12,82	3	7,69	7	17,95	2	5,13
GOOD	17	43,59	9	23,08	17	43,59	19	48,72	11	28,21
AVERAGE	6	15,38	11	28,21	13	33,33	11	28,21	14	35,90
BAD	7	17,95	11	28,21	3	7,69	1	2,56	5	12,82
WORST	7	17,95	3	7,69	3	7,69	1	2,56	7	17,95
TOTAL	39	100	39	100	39	100	39	100	39	100

It is observable from Table 12 that 39 fourth-grade students took part in all polygons. Two students completed the polygon of biotic motor knowledge for mastering obstacles with the best result, and they make up 5.13% of the total percentage of students. A total of 17 students achieved a good result, and they make up 43.59%. Six students achieved an average result, and they make up

15.38% of the total population. The category of students with a poor result includes seven students, which is 17.95%, and the category of students with the worst result includes seven students, which is, again, 17.95%. In the polygon of biotic motor knowledge for mastering space, five students achieved the best success and make up 12.82%.

Nine students, i.e., 23.08%, achieved a good result. The categories of students with average and poor results include 11 students, respectively, and each of these categories makes up 28.21% of the population. The worst success was achieved by three students, who make up 7.69% of the population. A total of three students completed the test of biotic motor knowledge for overcoming resistance with the best success, and they make up 7.69% of the total number of students. A total of 17 students achieved good results, and they make up 43.59%. 13 students achieved an average result, and they make up 33.33% of the tested population of fourth-grade students. Three students fall into the category with poor performance and three students into the category of the worst results. Each of these categories makes up 7.69% of the population. Seven students completed the polygon of biotic motor knowledge to manipulate objects with the hand with excellent results and make up 17.95%.

A total of 19 students achieved good results, and they make up 48.72%. The average success was achieved by 28.21%, i.e., 11 students. One student falls into the category of students with poor performance, and one student who falls into the category of the worst results. Each of these two categories makes up 2.56% of the population. Two students, or 5.13%, achieved the best result in the polygon of biotic motor knowledge for manipulating objects with the foot. A total of 11 students achieved good results, and they make up 28.21% of the total population. The average success was achieved by 35.90%, i.e., 14 students. Poor results were achieved by five students, which is 12.82%. The worst success was achieved by 7 students, who make up 17.95% of the total number of fourth-graders who participated in the measurements.

Table 7 ranks the results of male and female students by grades 1 through 4.

Table 7. Ranking by grade.

RESULT	1st grade		2nd grade		3rd grade		4th grade	
	F	%	F	%	F	%	F	%
BEST	8	18.18	1	2.86	1	2.50	11	28.21
GOOD	11	25.00	6	17.14	14	35.00	9	23.08
AVERAGE	13	29.55	10	28.57	17	42.50	11	28.21
BAD	8	18.18	15	42.86	6	15.00	4	10.26
WORST	3	6.82	3	8.57	2	5.00	4	10.26
TOTAL	43	100	35	100	40	100	39	100

Conclusion

Physical exercise is crucial for the proper growth and development of the child, and it is very important to adopt the habit of regular exercise from an early age. The emphasis is that children have a great need to move, and it is most natural for them to spend time playing and moving. The complexity of teaching Physical Education is precisely visible in the complexity of monitoring students and adapting teaching to each individual and his abilities. Few child's activities have such biotic conditioning as physical exercise, and, in education, it is designed only through Physical Education classes (Knjaz et al., 2008). It is evident from this research that the older the students, the

better their results, i.e., the older the students, the less time they need to complete the polygon. If we study the results with respect to sex, we found that boys performed better than girls in four of the five polygons. The boys achieved a better result in the polygon of biotic motor knowledge for overcoming obstacles, the polygon of biotic motor knowledge for mastering space, the polygon of biotic motor knowledge for manipulating objects with the hand, and the polygon of biotic motor knowledge for manipulating objects with the foot. The girls achieved a better result only in the range of motor skills to overcome resistance. We may argue that this happens because boys at that age are more involved in different sports and have a higher level of motivation for physical activity.

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