

IMPROVING EYE-HAND COORDINATION FOR THIRD GRADERS

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Abstract

Aim. In our scientific endeavor, we started from the hypothesis that the development of coordination between the visual analyzer and the hand can be achieved in the third class by carrying out games, sticks and application courses with components of throwing, catching or using some teaching materials (basketball, target, cubes, circles etc).

Methods. The experiment was conducted between November 24, 2018 - March 27, 2019 and comprised two stages: the first - initial testing of the students of the third class and, secondly - the final testing of the students participating in the experiment. The duration of the experiment was, therefore, about 4 months, and the location was the High School No.1, Mangalia (the school's gymnasium). The experiment was attended by 28 students of the third class (all the components of the same class - the third C), 14 girls and 14 boys. After the initial testing they were divided into two groups: experimental and control. Each of the two groups has 14 components (7 girls and 7 boys in each group).

Results. At the test throwing at the target, the experimental group recorded 74.28 ± 8.05 points, while the control group 54.64 ± 7.71 points. At the test throw the handball through the suspended circle, the experimental group recorded 9.64 ± 0.49 points and the control group 7.78 ± 0.97 points.

Conclusion. The subjects of the experimental group obtained significantly better results at the final test, compared to the initial one ($p < 0.01$). At the level of the control group there were no significant differences between the two tests - initial and final - ($p > 0.05$). The experimental group obtained significantly better results than the control at the final test, in all the tests that were administered. At the "target throw" test, at the final test, the boys in the experimental group obtained a significantly higher score than the girls in the same group.

Keywords: eye-hand, coordination, third graders.

Introduction

Within the school, the physical education has the task of contributing to the development and formation of the personality traits and components that the process of intellectual training and, in this case, the whole education system are concerned. The hours of physical education contribute to the development of the motor qualities - speed, endurance, strength, skill - leading implicitly to good and very good results in the performed tests, but also to the harmonious development of the student body (Mârza Dănilă & Mârza Dănilă, 2006).

As part of the preparation process, physical education must find all the ways and means through which it can act in the direction of strengthening and maintaining health, forming a wide range of knowledge, skills and skills, as well as educating moral qualities and will (Mrotek, et al. 2007). These major objectives of physical education determined the focus of attention to find efficient and highly practical possibilities, which would lead to good results in terms of motor skills development (Gheba, et al. 1995).

In modern teaching, the method of education is understood as a certain way of proceeding, of acting, a way that tends to place the student in

learning situations, more or less directed (Sailer, et al. 2005). For this reason, the development of the acuity and precision of the senses, the capacity of perception of space and time, the development of the spirit of observation, the initiative and the influence of the character traits (courage, determination, perseverance) must be done by carefully selected methods and means and that corresponds to the level of understanding and execution of the students of the third class (Thomas, et al. 1993).

Thus, the use of means that can be folded on the functional and psychological possibilities of the pre-pubertal students will lead to the faster acquisition of the components of the model proposed by the curriculum.

Method

In our scientific endeavor, we started from the hypothesis that the development of coordination between the visual analyzer and the hand can be achieved in the third class by carrying out games, sticks and application courses with components of throwing, catching or using some teaching materials (basketball, target, cubes, circles etc).

The experiment was conducted between November 24, 2018 - March 27, 2019 and comprised two stages: the first - initial testing of the

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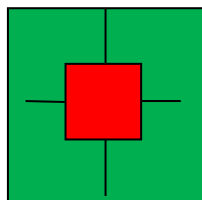
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students of the third class and, secondly - the final testing of the students participating in the experiment. The duration of the experiment was, therefore, about 4 months, and the location was the High School No.1, Mangalia (the school's gymnasium).

The experiment was attended by 28 students of the third class (all the components of the same class - the third C), 14 girls and 14 boys. After the initial testing they were divided into two groups: experimental and control. Each of the two groups has 14 components (7 girls and 7 boys in each group).

The actual test methods used to assess the skill of the motor skill are the following:

1. Target shooting. Subjects are placed behind a line drawn on the ground at a distance of 6 m from the target. The target is drawn on the wall 1.5 m from the ground and consists of 5 zones: 4 green and one red. The green square has the side of 2m and the red one of 1m.



The task is for the student to throw the tennis ball, at a distance of 6 m, trying to reach the red square. If the student hits one of the green squares he will receive 10 points, and if he hits the red square he will receive 20 points.

Each student throws 5 times at the target.

The scoring grid is as follows:

The qualifier	The test score	The qualifier score
Very good	76 – 100 p	20 p
Good	51 – 75 p	15 p
Satisfactory	26 – 50 p	10 p
Insufficient	0 – 25 p	5 p

2. Throwing and catching the ball through a circle suspended 1 m from the ground. The exercise is performed in pairs. Subjects face each other at a distance of 3 m (delimited by lines drawn on the ground). In the middle of the distance, a circle with a diameter of 70 cm is suspended, 1 m above the ground. At the signal the students begin to execute the passing and catching of the ball (handball). The task is for the ball to pass through the circle (without touching the ground) before it is caught by the teammate. Students have to perform 10 passes and 10 catches each (20 team throws). Each complete and correct catch and bird cycle is scored by 1 p.

The experiment was performed on 28 students of the third class and consisted of the

following: preliminary testing of subjects, initial testing and final testing.

Preliminary testing included harvesting somatic parameters (waist, weight, thoracic perimeter) and some motor parameters (running speed on 30 m and long jump on the spot). Based on the results obtained in this preliminary test, the subjects were divided into experimental (14 students) and control (14 students) groups.

After the split into the two groups, the subjects were initially tested. During this test, all subjects were administered the 3 skill tests described above. Afterwards, throughout the experiment, the students spent their normal time, according to the teacher's planning. As the physical education time was the last in the daily schedule, I could at the end of each hour, during the whole experiment, the students in the experimental group perform, for 15 minutes, specially chosen exercises and games, which were aimed at developing eye coordination. The students in the control group did not carry out the specially designed program, but at the end of the hour, they left home.

We present below the operational structures used in the experimental group:

1. Exercises for catching and birding using balls of different sizes and shapes (field tennis, handball, soccer, rugby), at a distance of maximum 3 m. With each ball 10-15 passes were executed, pause 40 ".
2. Throwing the handball in the air (top) and holding it with two hands, 4 series x 15 repeats, p 40 "between the series.
3. The same exercise, with the execution, until the catch of the ball, the indications given by the teacher: crouching, clapping, beating with the knees to the chest, turning 360°, etc., 4 series x 15 repetitions, p 40 "between the series.
4. Multiple dribbling, on the spot, with balls of different shapes and sizes (as in the first exercise), 2 x 10 with each type of ball, p 30 ".
5. The same drill exercise with straight line movement, 2 x 15m with each type of ball, p 40 ".
6. Throwing the handball, on the spot, at the gate drawn on the wall (the dimensions of the gate are reduced - 2m L / 1.5 m H), 4x10, p 30 ".
7. The game "Naveta" modified: two circles with a diameter of 60 cm at a distance of 30 cm from each other. In one of the circles there are 8 cubes (bowls, plastic bottles with sand). At the signal, the student must move, one by one, the cubes from one circle to another. It is executed either against the stopwatch, or on the pairs (the one who finishes first moving the cubes), 4 x, p 40 ".
8. The same drill exercise (5 students in each team, when the first has finished moving the cubes in the other circle, the next in the row performs moving the cubes back, in the first circle and so on. Win the row that ends first), 4 x, p 40 ".

9. For a volleyball write the figures from 0 to 5. The figures written are 15 cm high. Students are placed on pairs (each pair with its ball) face to face, at a distance of 2-3 m. It is performed catching and passing the ball with two hands, from the chest. The task is like when catching the ball, the student who gets to announce loudly what number was inscribed on the side of the ball. It runs 4 series x 10-15 passes, with 40 "break.

10. The same exercise in the form of a suveica: students are placed on two rows, face to face or, three rows, in a triangle. After executing the pass, the passer retires, at the tail of his own string. In this way, it is easier to control the teacher, because he has only one ball to follow. It can be executed for 4 x 30 ", p 40" or for 4 x 20 passes series, p 40 ".

11. Badminton game, without a net, in pairs. The task is to perform at least 20 shifts (10 complete pass cycles) with the butterfly, without it touching the ground.

12. Swing with the ball. The students are placed on two rows, at a distance of 20 m. The one who has the ball, dribbles in a straight line, 15 m (the distance is marked with lines drawn on the ground), catches the ball and passes it to the colleague from the opposite row. The passer-by sits at the tail of the line to which he passed the ball. He who receives the ball, continues the exercise. It can be executed for 4 x 30 ", p 40" or for 4 x 20 passes series, p 40 ".

13. The realization, in teams, of geometric figures, from smaller parts (huge puzzle). The teacher has cardboard (sponge pressed) which, if placed in a certain way, leads to a square, circle, triangle or rectangle. Each team receives a set of cards and the signal begins to "solve" the puzzle. The team that finishes the first to achieve the respective geometric figure wins.

14. From the hall there are 15 cm geometric shapes (cubes, circles, rectangles, triangles, spheres, pyramids, cylinders). Each 10 of each geometric shape. They work on teams. Each team has its own well-established place in the room and also a geometric figure. At the signal, the first player in each team (each child receives an order number) leaves at the highest speed in search of geometric figures distributed to his team. It is only allowed to bring one. When he has brought the figure into his team space, the next teammate leaves and so on. The team that brings all the geometric figures first wins. It runs 4 series, p 30 ".

15. The same exercise, but depending on how many geometric figures there are, so many students are designated. Each has the task of collecting, in a bag, a single type of geometric figures (only spheres or only pyramids). The little one who first collects the designated geometric figures. It runs 4 series, p 30 ".

16. The students are arranged on one or more rows. In front of them, a teammate is at a distance of 10 m.

At 5 m in front of each row, on the ground there is a circle inside which there are several balls, including a handball. 3 m beyond the ball circle, there is a suspended circle (60 cm in diameter). Basically, the teammate is 2 m beyond the suspended circle. At the signal, the first student in each row runs to the ball circle, picks up the handball and passes it through the teammate's circle. He catches it and relays it all through the circle. The one who picked up the ball, picked it up and left it in the ball circle, ran to his line and handed the baton to the next colleague. The game continues until all students go through the posture of the catcher (beyond the suspended circle).

17. Students are divided into 2 teams. On the ground are placed 2 circles where there are several balls of different shapes and sizes (field tennis, rugby, volleyball, football). Each student has a handball ball. The number of balls in circles is equal to that of the students on the field. In a previously established space (15/15 m), the students perform dribbling with the handball. At the signal, each student runs to the circle and exchanges the handball with one of the ones placed in the circle, and continues to perform, dribbling with movement and so on, 4 x 30 ", p 60".

Each of these exercises was used throughout the experiment. It was envisaged that every hour, two different operational structures will be executed, and during a month (ie 8 hours of physical education) they will not be repeated. Here is an example of the operational structures used for the first month of the experiment:

First hour: Exercises 1 and 4.

Second hour: Exercises 2 and 6.

Third hour: Exercises 7 and 9.

Fourth hour: Exercises 3 and 14.

Fifth hour: Exercises 5 and 16.

Sixth hour: Exercises 8 and 10.

Seventh hour: Exercises 12 and 13.

Eighth hour: Exercises 11 and 15.

From month to month, during the experiment, the exercise structures were modified in the sense that the same order of exercises was not kept. It was considered, as far as possible not to execute the same type of exercise (if the first exercise was dribbling away, I looked for the second one is not one based on dribbling).

To achieve the experimental and control groups, the students of the third class were tested from a somatic and motor point of view. Somatic parameters followed were: waist, weight and chest perimeter in inspiration, expiration and chest elasticity. And from the motor point of view, the following indices were targeted: the speed run on 30 m and the long jump on the spot (Table no. 1).

Table no.1: Somatic parameters of the tested students (N=28; X ± DS).

Subjects	Parameters				
	Height	Weight	Chest	Chest	Chest

	(cm)	(kg)	perimeter in inspiration	perimeter expired	elasticity
Girls (N=14)	142,42 ± 6,54	38,32 ± 3,10	62,95 ± 1,67	59,26 ± 1,58	3,68 ± 0,82
Boys (N=14)	148,57 ± 7,76	41,35 ± 5,53	62,20 ± 1,71	58,25 ± 1,27	3,92 ± 0,65

Based on these results, the students were randomly divided into two groups, each containing 7 girls and 7 boys, so a total of 14 subjects. Thus the experimental and control groups were achieved, both with homogeneous composition.

Results

Presentation of data at initial testing

1. Throw at the target

The experimental group recorded 52.14 ± 3.23 points, while the control group recorded 51.07 ± 5.94 points (Figure no. 1). Statistical analysis did not reveal significant differences between groups ($t = 0.743$; $p > 0.05$).

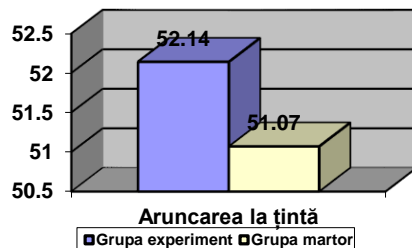


Figure no.1: The score obtained in the "target throw" test by the two groups.

Comparative analysis of data for each sex found the following: in the experimental group there are no significant differences between girls and boys ($t = 0.821$; $p > 0.05$); In contrast, in the control group, the boys achieved significantly better results than the girls ($t = 2,363$; $p < 0.05$; Table no. 2).

Table no.2: The results obtained in the "target throw" test (points). Comparison between sexes and between groups.

Group	Girls (N=7)	Boys (N=7)
Experimental	51.42 ± 2.43	52.85 ± 3.93
Control	47.85 ± 6.36	$54.28^a \pm 3.45$

Legend: a - significantly better than girls, $p < 0.05$.

Regarding the comparison of the results between groups, on each sex, neither in the case of girls ($t = 1,394$; $p > 0.05$) nor in the case of boys ($t = 0.729$; $p > 0.05$) there were statistically significant differences.

2. Throw the handball through the suspended circle

In this test the experimental group recorded 7.64 ± 1.21 points, while the control group 7.42 ± 1.22 points (Figure no. 2). Statistical analysis did not reveal significant differences between groups ($t =$

0.500 ; $p > 0.05$).

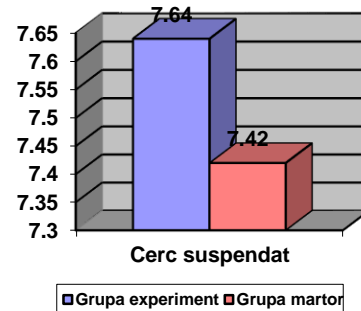


Figure no.2: The results obtained in the test "throwing the handball through the suspended circle"

Regarding the comparative analysis of data for each sex, it is found that both within the experimental group ($t = 1,142$; $p > 0.05$) and within the control group ($t = 1.416$; $p > 0.05$) there were no significant differences between boys and girls (Table no.3).

Table no.3: The results obtained in the test "throwing the handball through the suspended circle" (points). Comparison between sexes and between groups.

Group	Girls (N=7)	Boys (N=7)
Experimental	7.28 ± 1.49	8.00 ± 0.81
Control	7.00 ± 1.29	7.85 ± 1.06

Comparison of the results between groups, on each sex, showed no significant differences in this test, neither in girls ($t = 0.394$; $p > 0.05$) nor in boys ($t = 0.300$; $p > 0$).

Presentation of data at final testing

1. Throw in the target

The experimental group recorded 74.28 ± 8.05 points, while the control group had 54.64 ± 7.71 points (Figure no. 3). Statistical analysis showed that the experimental group obtained better results than the control group ($t = 6,612$; $p < 0.01$).

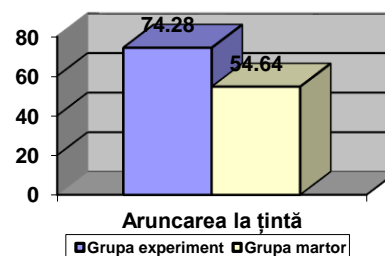


Figure no.3: The score obtained at the "target throw" test by the two groups.

Comparative analysis of data for each sex showed that neither in the experimental group ($t = 1,798$; $p > 0.05$) nor in the control group ($t = 2.051$; $p > 0.05$) there are no significant differences between girls and boys (Table no.4).

Table no.4: Results obtained in the "target throw" test (points). Comparison between sexes and between groups.

Group	Girls (N=7)	Boys (N=7)
Experimental	70.71 ^a ± 6.72	77.85 ^a ± 8.09
Control	50,71 ± 6,72	58,57 ± 6,90

Legend: a - significantly better than those in the control group, p <0.01.

Regarding the comparison of the results between groups, on each sex separately, and in the case of girls (t = 5,571; p <0.01) and in the case of boys (t = 4,796; p <0.01) significant differences in favor of girls and boys in the experimental group.

2. Throw the handball through the suspended circle

In this test the experimental group recorded 9.64 ± 0.49 points, while the control group 7.78 ± 0.97 points (Figure no. 4). Statistical analysis showed that the experimental group obtained significantly better results than the control group (t = 7.150; p <0.01).

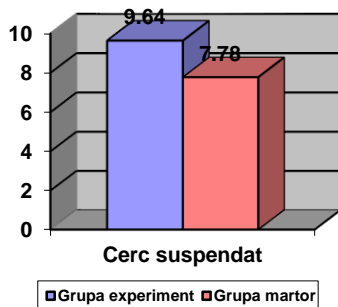


Figure no.4: The results obtained at the trial "throwing the handball ball through the suspended circle"

Regarding the comparative analysis of data for each sex, it is found that both within the experimental group (t = 0.538; p > 0.05) and within the control group (t = 1.166; p > 0.05) there were no significant differences between boys and girls (Table no.5).

Table no.5: The results obtained in the test "throwing the handball through the suspended circle" (points). Comparison between sexes and between groups.

Group	Girls (N=7)	Boys (N=7)
Experimental	9,57 ^a ± 0,53	9,71 ^a ± 0,48
Control	7,28 ± 1,11	8,28 ± 0,48

Legend: a - significantly better than the control group, p <0.01.

Comparison of the results between groups, on each sex, showed that the girls in the experimental group obtained significantly better results than the girls in the control group (t = 5.088; p <0.01). The same is also true for boys: those in the experimental group had significantly better results than those in the control group (t = 5.958; p <0.01).

Table 6: The results obtained by the control group at the initial and final testing

Tests	Initial testing	Final test
Target throw (pt)	51,07± 5,94	65,35± 3,65
Throwing the handball ball through the suspended circle (pct)	7,42± 1,22	8,21 ± 0,69

The statistical analysis of the data in the table revealed that in none of the tests the control group subjects obtained significantly different results at the final test, compared to the initial test. However, in absolute value an improvement of the results at the final test, compared to the initial test, is observed in all the tests. This increase in absolute value can be attributed to the natural development - physical and motor - of the students.

According to the score grid created by us (and presented in the subchapter "Presentation of the measurement and evaluation system used in the experiment"), at the initial testing the control group obtained a final score of 32 points, which corresponds to the "good" rating.

At the final test the group obtained 38 points, which places it all in the "good" qualifying area. This was expected because, as we have shown the differences between the initial and final test results are not significantly different.

Table 7: The results obtained by the experimental group at the initial and final testing.

Tests	Initial testing	Final test
Target throw (pt)	52,14 ± 3,23	74,28 ^{a±} 8,05
Throwing the handball ball through the suspended circle (pct)	7,64 ± 1,21	9,64 ^{b±} 0,49

Legend: a - significantly different from the initial test, p <0.01.

b - significantly different from the initial test, p <0.05.

At the level of this batch, the statistical analysis of the data revealed that, in each test, the results from the final testing are significantly better than those from the initial testing. Outside the test "throwing the ball through the suspended circle", where the significance threshold of the difference was 0.05, in all other tests, the values recorded at the final test were at the significance threshold of 0.01.

Therefore, we can conclude that the operational structures proposed by us have led to an increase in the indexes of hand-eye coordination in this age category.

According to the scoring grid at the initial testing, the experimental group obtained a final score of 33 points, which corresponds to the "good" rating, and at the final testing the group obtained 45

points, which places it in the "very good" rating area.

Compared to the control group, at the initial testing the scores obtained were substantially equal. This is because, following the application of somatic and motor tests, we have tried to create groups that are as homogeneous as possible, so that the results of the experiment are largely due to the specific work done at each hour of physical education.

This fact was proved, both by the values recorded at the final test (by the control group) and by the score obtained by the experimental group - 45 points, compared to only 38 points of the control group.

Our results are in agreement with those of other researchers (Johansson, et al. 2001; Crawford, et al. 2004), who found that specific work leads to improved performances of coordinative ability. The only difference between our study and theirs is the age of the subjects tested (10 years and 19 years). However, considering that the period between 7 and 12 years is most conducive to the acquisition and development of motor skills, in particular skill / coordination, we consider that it is not wrong to refer to studies performed on older subjects.

In the following we will compare the results obtained by the two groups at the final test.

1. Throw in the target

The experimental group recorded 74.28 ± 8.05 points, while the control group 54.64 ± 7.71 points (Figure no. 5). Statistical analysis showed that the experimental group obtained better results than the control group ($t = 6,612$; $p < 0.01$).

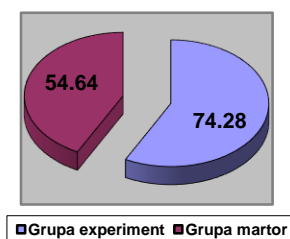


Figure no.5: The score obtained in the "target throw" test by the two groups.

2. Throw the handball through the suspended circle

In this test, the experimental group recorded 9.64 ± 0.49 points and the control group 7.78 ± 0.97 points (Figure no. 8). Statistical analysis showed that the experimental group obtained significantly better results than the control group ($t =$

7.150 ; $p < 0.01$).

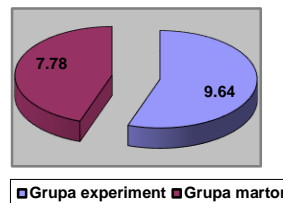


Figure no. 6: The results obtained in the test "throwing the handball through the suspended circle"

Conclusions

The working hypothesis was verified; the proposed operational structures have achieved their purpose for which they were designed - strengthening coordination, in the students of the third class.

The subjects of the experimental group obtained significantly better results at the final test, compared to the initial one ($p < 0.01$). At the level of the control group there were no significant differences between the two tests - initial and final ($p > 0.05$). The experimental group obtained significantly better results than the control at the final test, in all the tests that were administered. At the "target throw" test, at the final test, the boys in the experimental group obtained a significantly higher score than the girls in the same group. final score obtained by the experimental group (45 p) is significantly higher than that of the control group (38 p), which allows us to argue that the students of the experimental group have a better eye-hand coordination capacity.

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