

## IMPROVING THE REACTION TIME OF SECONDARY SCHOOL PUPILS (GRADES V-VI) THROUGH CREATIVE EXERCISES SPECIFIC FOR SCHOOL BASKETBALL

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**ABSTRACT.** The paper shows a pragmatic strategy in order to optimize the means for improving the reaction time of secondary school pupils (grades V-VI). In order to improve this psychomotor skill within the field of basketball in secondary school we used certain exercises and practiced them with the pupils, exercises which demanded fast reactions upon different signals (sound, tactile, visual), starting from different initial positions. During the first phase specific exercises as responses to different signals were conceived under our guidance with the entire class, which were then practiced. During a second phase, after having understood the task, the children divided into teams needed to conceive similar exercises. The most significant were then practiced with the entire class, using up front practicing (with even and individual pace), in pairs or groups. As a result of processing the information gathered during the final tests, it can be observed that the values of the trial group are better than the ones of the control group. This fact proves the efficiency of the independent variable (strategy and applied exercises) and its influence on the dependent variable meaning the results obtained and the improvements pointed out. The paper describes some of the exercises used and applied to the trial group.

**Keywords:** skill, psychomotor skill, reaction time, sound signal, visual signal, initial position, technical procedure.

**REZUMAT.** Dezvoltarea vitezei de reacție la elevii de gimnaziu (clasele V-VI), prin exerciții creative specifice baschetului școlar. Lucrarea prezintă o strategie pragmatică în vederea optimizării mijloacelor pentru dezvoltarea vitezei de reacție la elevii din ciclul gimnazial (clasele V-VI). Pentru dezvoltarea acestei aptitudini psihomotrice, în cadrul disciplinei baschet la ciclul gimnazial, am folosit și am exersat cu elevii exerciții care au necesitat reacții rapide la diferite semnale (sonor, tactil, vizual), pornind din diferite poziții inițiale. În prima fază, cu toată clasa, sub îndrumarea noastră au fost concepute și s-au exersat exerciții specifice cu răspunsuri la diferite semnale urmand ca, în faza a doua, după înțelegerea sarcinii, elevii împărțiți în formații de lucru diferite să conceapă exerciții analoage. Cele mai

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semnificative au fost exersate cu toată clasa folosind exersare frontală ( în tempo uniform sau individual), pe perechi sau pe grupe. În urma prelucrării datelor obținute la testările finale se poate observa că valorile obținute de lotul experimental sunt superioare lotului martor. Acest fapt demonstrează eficacitatea variabilei independente (strategia și exercițiile aplicate) și influența acesteia asupra variabilei dependente reprezentată de rezultatele obținute și de progresele evidențiate. Lucrarea descrie câteva din exercițiile aplicate lotului experimental.

**Cuvinte cheie:** aptitudine, aptitudine psiho-motrică, viteza de reacție, semnal sonor, semnal vizual, poziție inițială, procedeu tehnic.

### **General Remarks**

Reaction time is a manifestation form of speed, depending on the five components (appearance of the impulse with the receptor; transmission with the corresponding means; analysis of the impulse – which takes the most time; transmission with the corresponding means; stimulation of muscles). *„Reactions are either simple or complex. Simple reactions are when the response comes as an answer to a movement already known and which occurs spontaneously. Complex reactions mainly show in bilateral games, but also in sports, where the answer needs to take into account the actions of a „partener” or „opponent” ( cf. Cârstea,G., 1996).*

Some research done by Thorner (cf. Cârstea, Gh., 1997) place the latent time somewhere between 140 and 180 miliseconds (140 ms with tactile stimuli, 150 ms with sound signals, 180 ms with visual signals).

Reaction time has different manifestation indicants for each body segment. The best indicants are generally registered with the upper limbs, according to conducted research.

Reaction time decreases (improves) under the influence of specific exercises within age 8 and 25, then it comes to a stillstand until around an age of 60 years, when it starts to decrease. As it is a psychomotor skill with a great degree of heritability (heredity approximately 90%), it can be improved, but within narrow boundaries.

Reaction time has its peak around the age of 20.

In order to improve the reaction time in basketball in secondary school we used and practiced with the pupils certain exercises which called for fast reactions at different signals (sound, tactile, visual), starting from different initial positions.

### **Hypothesis**

We consider that by applying a set of creative exercises specific for the game of basketball, conceived by the teacher together with the pupils the reaction time improves significantly.

### Aim of the paper

Showing an optimal number of specific exercises for the improvement of the reaction time in pupils of grades V and VI, according to the existing didactic premisses and infrastructure, in order to improve the instruction process in secondary school basketball.

### Location and materials

The trial took place at „Nicolae Titulescu” school from Cluj-Napoca. The school is well equipped for meeting the demands of the school curriculum for basketball.

### Subjects of the trial

Pupils from grades V and VI of „Nicolae Titulescu” school Cluj-Napoca were subjects in the trial.

106 pupils took part in the trial, 52 girls and 54 boys, equally divided into trail groups and control groups.

**Table no. 1.** Number of sample of the form

Grade	Boys		Girls		Sum
	Trial	Control	Trial	Control	
a V-a	14	14	14	14	56
a VI-a	13	13	12	12	50
<b>Total</b>	<b>27</b>	<b>27</b>	<b>26</b>	<b>26</b>	<b>106</b>

The trial groups were made up of pupils from grades V A and VI B, and the control groups of pupils from groups V B and VI A.

### Organisation, phases and development of the trial

The trial took place under normal conditions during the physical education classes with focus on (learning topics) basketball, according to the structure of the school year, divided into semesters and focusing on the suggested work hypothesis.

The trial took place from October 2011 to February 2012.

The trial consisted of **4 phases**:

Phase no. 1 – *pre-trial*: October, 10<sup>th</sup> – 14<sup>th</sup> 2011.

Phase no. 2 – *trial* (per se): October, 16<sup>th</sup> – November, 14<sup>th</sup> 2011.

Phase no. 3 – *post-trial*: November, 18<sup>th</sup> – November, 22<sup>nd</sup>

Phase no. 4 – *retesting* (February, 10<sup>th</sup> – December, 20<sup>th</sup>)

## Investigation Methods

The reaction time is tested using the gymnastics stick with the test of the „falling stick”. The stick was graded every centimeter, starting with 0, 1, 2, 3, ..., n up to the other end. The pupil from a standing position, feet slightly apart and with the right (left) arm in front, slightly bended from the elbow holds the palm open oriented towards the stick and with the side where the 0 grading is. The tester releases the stick by surprise and the pupil needs to catch it as fast as possible. The distance from point 0 to the point where the stick is grabbed by the pupil is measured. The test is conducted three times and the average is recorded.

In order to improve the reaction time within the field of basketball in secondary school we used certain exercises and trained them with the pupils, exercises which demanded fast reactions upon different signals (sound, tactile, visual), starting from different initial positions.

In parts 2 - 3 of the lesson and in the fundamental parts 4 and 5, during each lesson the improvement of the reaction time was especially trained for 10 - 12 minutes (during the experimental phase). During the first phase specific exercises as responses to different signals were conceived under our guidance with the entire class, which were then practiced. During a second phase, after having understood the task, the children divided into teams needed to conceive similar exercises. The most significant were then practiced with the entire class, using up front practicing (with even and individual pace), in pairs or groups.

In the following we present the conceived exercises, which were applied on the trial group.

**Table no. 2.** The conceived exercises applied on the trial group

1	Standing, ball in front of the body	Reverse comand: „All players run” - they will jump „All players jump” - they will dribble „All players dribble” - they will run	6 X	Spread out on the entire basketball court	Up front practice
2	Standing	Pupils run, the teacher suddenly shouts out a number and the pupils form a group of 3, 4, 5 (according to the number shouted out).	2 X	Spread out on the entire basketball field	Up front practice
3	Ventral decubitus	Upon a signal the pupils stand up and run, upon a second signal they lie down again face down, and so on (other starting positions can be introduced)	2 X	In columns of 4	Up front practice in rows
4	Standing, ball in front of the body	Special rebounder panel and catching the ball without it falling down	5 min	5 pupils per panel	Individual training
5	Standing, ball in front of the body	Passes at the wall bars and catching the ball without it falling down	5 min	3 pupils per wall bar	Individual training
6	Standing, ball in front of the body	Passes at the backboard, or at the wall with the rugby ball and catching the ball without it falling down	4 min	On 4 columns	Individual training

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7	Standing, ball in front of the body	Standing dribbling, upon hearing the whistle clap hands twice and continue dribbling.	6 X	In a line on 4 rows	Up front practice
8	Standing pairwise, face to face, with a ball	One of the partners holds the ball in their hands, with arms stretched out in front (the other pupil holds the arms wider, prepared at about 5cm under the ball. The pupil with the ball releases the ball suddenly and the partner needs to catch it before it reaches the ground (they change tasks)	4 X	Pairwise, with a ball	Up front practice, pairwise
9	Standing face to back, each with a ball	The one standing with the back at their partner dribbles standing, the other one holds the ball up in front. Upon signal "1" from the one at the back, the one in front dribbles twice and moves the ball fast from one hand to the other in front, upon signal "2" they jump 180° and catch the ball which is released by the team member (they change tasks)	4 X	Pairwise, each with a ball	Up front practice, pairwise
10	Standing face to back, pairwise	The one standing face forward holds a gymnastics stick vertically from one end, with the arm lifted up forward. Upon signal ("go") the stick is dropped and the one with the back (who dribbles standing) turns around to try to catch the stick, before it hits the ground (they change tasks).	4 X	Pairwise, with a ball	Up front practice, pairwise
11	Standing face to face, pairwise	One of the pupils dribbles standing, while holding the other hand around and 5 cm from the upper end of the stick (they do not touch the stick), which is held by the other team member vertically. Suddenly the stick is dropped and the pupil dribbling standing needs to catch it by closing the palm (the dribbling does not stop).	6 X	Pairwise, with a ball	Up front practice, pairwise
12	Standing face to back with a ball	The one standing face forward shouts a number: "1" or "2" and will then pass the ball. According to the number shouted the team member will jump vertically with right, or left turning respectively at 180°, gets the ball, passes it back and returns to the initial position (they change tasks).	6 X	Pairwise, with a ball	Up front practice, pairwise
13	Standing, face to face with a ball, bended knees	One of the pupils passes randomly, the other team member will react correspondingly, i.e. if the pass is directly to the chest, catching the ball will be preceded by one clap of the hands; if they bounce pass the catching is preceded by two claps of the hands.	6 X	Pairwise, with the ball	Up front practice, pairwise
14	Face to face, pairwise, each with a ball	The pupils dribble standing pairwise, while a pole is placed in between them. Upon hearing the whistle they will touch the pole fast with the hand that is not dribbling.	6 X	Pairwise, each with ball	Up front practice, pairwise

15	Face to face, pairwise, each with a ball	Dribbling standing with the right hand, upon hearing the whistle slap palms with the left hand (the pair reacting fastest wins). They change the hand for dribbling.	6 X	Pairwise, each with a ball	Up front practice, pairwise
16	Face to face, pairwise, each with a ball	Dribbling standing with the right hand, upon hearing the whistle moving the ball with dribble to the left hand and slap palms (with the right hand).	6 X	Pairwise, each with a ball	Up front practice, pairwise
17	Face to face, pairwise, each with a ball	Standing high speed passes, upon hearing the whistle the type of pass is changed.	2 min	Pairwise, with a ball	Up front practice, pairwise
18	Face to face, pairwise, each with a ball	Standing passes with 2 balls (one pupil does the bounce pass the other one the chest pass), upon hearing the whistle the pupils change the pass type (the one having bounce passed chest passes and vice-versa)	10 X	Pairwise, face to face with 2 balls	Up front practice, pairwise
19	Face to face, pairwise, each with a ball	Standing passes with 2 balls (one pupil does the bounce pass, the other one the chest pass), upon hearing the whistle they change the pass type (the one having done the chest pass, bounce passes and vice versa), upon hearing two whistles the initial pass types are trained.	4 X	Pairwise, face to face with 2 balls	Up front practice, pairwise
20	Pairwise, each with a ball	Game: „Stopping the dribbling”	2 min	Pairwise, each with a ball	Up front practice, pairwise

## Results and discussions

**Table no. 3.** Statistic indicators regarding the test “FALLING STICK” (trail group, boys)

Gr.	TRAIL GROUP								
	AVERAGE			S.D			V.C.		
	T1	T2	Ret.	T1	T2	Ret.	T1	T2	Ret.
V	22,07	19,07	18,9	4,026	3,863	3,9	18,24	20,25	20
VI	19,61	14,76	14,4	2,466	2,153	2,16	12,57	14,58	14,11

**Table no. 4.** Statistic indicators regarding the test “FALLING STICK” (control group, boys)

CONTROL GROUP								
AVERAGE			S.D.			V.C.		
T1	T2	Ret.	T1	T2	Ret.	T1	T2	Ret.
21,64	20,42	20,64	2,348	2,194	1,79	10,85	10,75	8,68
19,53	16,53	17,46	2,340	1,646	2,09	11,98	9,57	12,01

**Table no. 5.** Statistic indicators regarding the test “FALLING STICK”  
(trail group, girls)

CI	TRAIL GROUP								
	AVERAGE			S.D.			C.V.		
	T1	T2	Ret.	T1	T2	Ret.	T1	T2	Ret.
V	21,57	18,42	18,9	2,691	1,953	2,06	12,47	10,6	10,6
VI	20,41	15,41	15,75	3,04	1,552	1,36	14,89	10,07	8,66

**Table no. 6.** Statistic indicators regarding the test “FALLING STICK”  
(control group, girls)

CONTROL GROUP								
AVERAGE			S.D.			C.V.		
T1	T2	Ret.	T1	T2	Ret.	T1	T2	Ret.
21,64	22,35	21,21	2,255	1,505	1,61	10,42	6,73	7,59
20	18,66	18,91	3,162	2,321	2,75	15,81	12,43	14,55

**Table no. 7.** Significance of the difference  
between the average in trail groups

Grade	Test “t” student
Grade V boys	2,1
Grade V girls	3,2
Grade VI boys	2,4
Grade VI girls	4,4

With the boys’ groups improvements are obvious at all grades, comparing T1 and T2 with significantly higher values as compared to the control group (image 1- 4).

The variability coefficient (V.C.) shows medium homogeneity in almost all grades in the trial, except grade V, trial group, where low homogeneity is recorded (20,25%).

With the retesting, except grade VI, which records a small improvement, the other grades record setbacks (image 1).

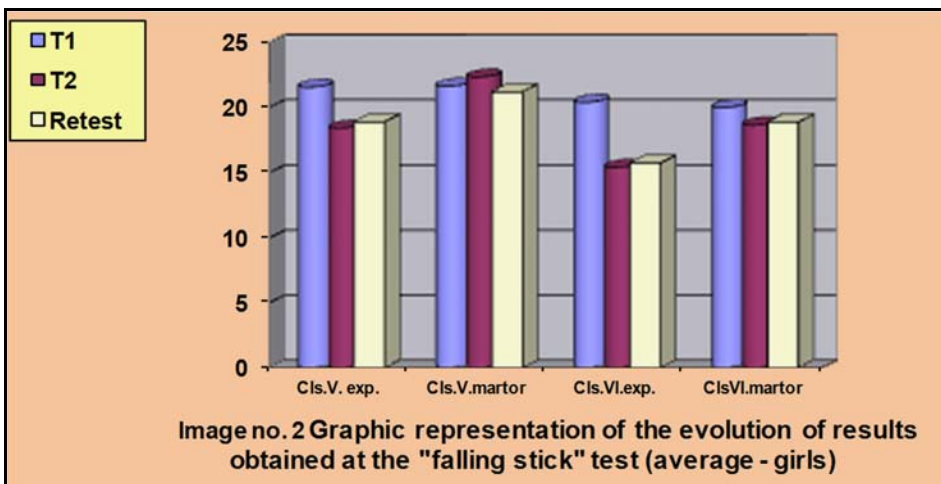
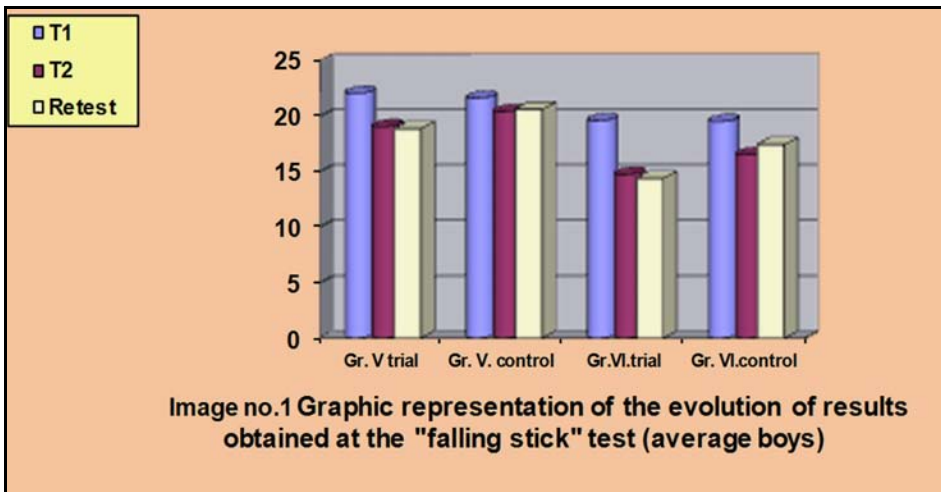
Girls record obvious improvements from T1 to T2 for the entire group taking part in the trial. Trial groups record better performance at the final test (image 2).

The variability coefficient shows medium homogeneity in all grades, except grade V, control group, where homogeneity is high (6,73%).

With the retesting the girls, except grade V trial group, who record a lower performance, all other grades record a slight improvement.

The best improvement from T1 to T2 after applying the independent variable is recorded in trial groups of grades VI boys and girls.

Between the initial average of the group during the pre-trial phase and the final average from the post-trial group, as a result of calculating the significance index t student, significant differences are recorded, with a probability of 0,05%, except grade V boys, who present non-significant values. The strongest value is recorded in grade VI girls, also due to the fact that they recorded low values at the initial test.





## Conclusions

1. The conceived and conducted exercises are efficient and contribute to the improvement of the reaction time.

2. We consider that the statistical indicators applied (means, standard deviation, variability coefficient, significance of the difference) allowed us to record valid and significant results, which the interpretation of the results of this research are based on.

3. After processing the data, at the final tests it can be observed that the values of the trial group are better than the ones of the control group. This proves the efficiency of the independent variable (strategy and applied exercises) and its influence on the dependant variable represented by the results obtained and the progress pointed out.

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