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CONTRIBUTION TO THE DEVELOPMENT OF MOTOR QUALITY SPEED THROUGH DYNAMIC GAMES IN MIDDLE SCHOOL STUDENTS

Dumbravă Andrei-Robert
[1] Boghicea Middle School, Neamț County
[1]robertdum86@yahoo.com
Leuciuc Florin Valentin
[2]"Ștefan cel Mare University", Suceava
[2]*florin.leuciuc@usm.ro*

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Abstract

This methodical-scientific paper addresses the topic of developing the motor quality speed in middle school students through dynamic games. The study highlights the essential role of physical education in the harmonious development of students and details the psycho-physiological characteristics of children aged 11 to 15 years. It analyzes the concepts of speed (reaction, execution, repetition) and motor game, emphasizing the importance of dynamic games to counteract monotony and stimulate competitive spirit. The research involved the identification and application of 20 motor games specially designed to improve speed in 5th-grade students. The results, validated by statistical-mathematical methods and comparative analysis, demonstrate significant progress, supporting the effectiveness of dynamic games in speed development.

Introduction

Education in Romanian schools aims to support the free, complete, and balanced development of each student. This process seeks to shape a complex personality, preparing young people not only to accumulate knowledge but also to reach their full potential. To address this challenge, it is necessary to diversify educational intervention methods. Physical education is a fundamental component of this process, contributing to the harmonious development of students through rigorous planning and organization. It positively influences the functioning and structure of the body, strengthens physical and mental capacities, and stimulates the growth of strength and endurance.

Physical exercise is the key tool of physical education, a systematic and conscious motor action aimed at optimizing and improving both the physical and mental development of students. The importance of physical education and sports is greater than ever. Dynamic games, relays, and applied courses are integrated into

training sessions to eliminate monotony, cultivate a passion for competition, and promote a healthy body [9].

Middle school is a fundamental transitional period, marked by extremely rapid and complex physiological and biological changes, called puberty and early adolescence. Puberty is manifested by rapid growth, distinct physical differences between sexes, and disharmonious variations in body proportions. Morphologically, the bone structure becomes similar to that of adults, but skeletal muscles develop predominantly through elongation, not by increasing muscle strength. Joint mobility is reduced, and the skeletal system tends to strengthen, but there is an increased risk of spinal deformities. Muscle strength is generally very low, which can contribute to the appearance of spinal deformities and flat feet. Functionally, the heart increases in mass and volume, but the heart muscle does not develop at the same rate, and blood vessels grow more slowly, which can lead to arrhythmias. The cortex becomes more excitable, which explains the specific behavioral manifestations of puberty: outbursts, excessive exuberance, and increased irritability [5].

Early adolescence is a period of intense curiosity and a desire to know and be recognized. Memory becomes predominantly logical, based on the selection and understanding of essential information. Language and the ability to observe are highly developed. Emotions are marked by spontaneous behaviors and rapid transitions. Characteristic features include the development of feelings of duty, responsibility, honesty, and honor. Close friendships are formed, especially between people of the same sex. Adolescence is a period of deep self-discovery and increased interest in oneself. Students show a strong desire to move and play. All these characteristics make adolescence considered "the second birth of the child" [8,10].

In modern society, speed is an essential quality, defined by specialists as "the ability to perform an action quickly". Although it is an innate trait and difficult to perfect, speed can be improved through training. The positive transfer of speed is more pronounced in beginners or less prepared individuals [6].

The value of speed is influenced by a complex series of factors, classified into four categories: Neuro-physiological: Cortical mobility of neurons, rapid alternation of excitation and inhibition, speed of nerve impulse transmission, and the optimal rate of alternation in muscle contraction and relaxation; Muscular and Energetic (Biochemical): The quality of muscle fibers (fast vs. slow fibers) and the value of energy sources (ATP and phosphocreatine); Psychological: The ability to concentrate and mobilize, as well as the level of development of other motor qualities; Morphological (Structural): Physical characteristics, such as the length of body segments and joint mobility [11].

Speed does not depend only on intrinsic factors but also on its interaction with other motor qualities, such as strength, endurance, technique (coordination), and flexibility. There are considered to be four main forms of speed, considered relatively independent: Reaction speed: The speed with which an organism responds to a

stimulus. This includes perception, signal processing, and the initiation of motor action; Execution speed: The speed with which a single movement is performed, from its beginning to its completion; Repetition speed (Movement frequency): The frequency with which movements are repeated in a unit of time, influenced by the brain's ability to switch rapidly between states of excitation and inhibition; Locomotion speed: The integrated rate of motor action by which a person moves forward in space [2,3].

The school physical education curriculum aims to develop students' speed, with specific objectives for each grade level. In middle school, the focus is on reaction speed in grades V-VI, and in grades VII-VIII, execution speed is also added. Throughout the entire cycle, the goal is to improve repetitive movement and locomotion speed [1].

Play is an expression of inner feelings, structured for relaxation, helping children cope with challenges and integrate socially. Movement games are a valuable tool in education, having a formative and instructive component in physical education. They contribute to the development of basic motor skills and qualities, such as running, jumping, and throwing. A major advantage is that they allow students to demonstrate behavioral independence, even within strict rules. The main goal of the motor game is to overcome obstacles to achieve a goal in a constantly changing situation [4,7].

Materials and Methods

The research started from the need to identify effective and attractive methods for developing the motor quality speed in middle school students. The main objective was to identify, select, and establish the criteria for using specific motor games, individually adapted, to improve speed in 5th-grade students. The hypothesis was formulated that the systematic use of dynamic games would contribute significantly to the development of this motor quality. The study was conducted on a sample of 5th-grade students, structured into an experimental group and a control group. The research took place during the 2024-2025 school year. Initial tests were conducted in September-October 2024, and final tests in April 2025.

Twenty dynamic games were designed and implemented, specially selected for speed development. These games were integrated into the physical education classes of the experimental group. Each game was described in detail, including rules, organization, and possibilities for adaptation. Examples of games include "Crabs and Shrimps" and "Follow Me," designed to train reaction speed, locomotion speed, and execution speed in playful contexts.

To evaluate progress, the following tests and measurements were applied:

Somatic parameters: Measurement of height, body weight, and chest perimeter (inspiration, expiration, chest elasticity).

Motor tests:

- Speed: Short-distance running test (50m).
- Shuttle run: Running test with changes of direction.
- Standing long jump: Measurement of explosive leg strength.

The collected data were processed and analyzed using statistical-mathematical methods. A comparative analysis was performed between the initial and final results of both groups (experimental and control), as well as a comparison between the two groups, to evaluate the effectiveness of the intervention program.

Results

The analysis of the data collected from the initial and final tests revealed changes in the somatic and motor parameters of the students in both groups. The results are presented in detail in tables and graphs, illustrating the evolution of each group.

Table 1. Table of group averages for each test

Test	Gender	Group	Average at initial test	Average at final test	Difference
Height	Girls	Control	148 cm	150 cm	2 cm
		Experimental	149 cm	153 cm	4 cm
	Boys	Control	152 cm	154 cm	2 cm
		Experimental	149 cm	153 cm	4 cm
Weight	Girls	Control	42 kg	44 kg	2 kg
		Experimental	35 kg	38 kg	3 kg
	Boys	Control	38 kg	41 kg	3 kg
		Experimental	39 kg	41 kg	2 kg
Chest perimeter on inspiration	Girls	Control	75 cm	76 cm	1 cm
		Experimental	74 cm	76 cm	2 cm
	Boys	Control	73 cm	76 cm	3 cm
		Experimental	74 cm	75 cm	1 cm
Chest perimeter on expiration	Girls	Control	65 cm	71 cm	6 cm
		Experimental	68 cm	69 cm	1 cm
	Boys	Control	69 cm	80 cm	11 cm
		Experimental	68 cm	69 cm	cm
Chest perimeter elasticity	Girls	Control	5 cm	5 cm	0 cm
		Experimental	6 cm	7 cm	cm

Test	Gender	Group	Average at initial test	Average at final test	Difference
	Boys	Control	4 cm	5 cm	1 cm
		Experimental	6 cm	6 cm	0 cm
50m speed run	Girls	Control	10 seconds	9.2 seconds	0.8 seconds
		Experimental	9.8 seconds	9.1 seconds	0.7 seconds
	Boys	Control	9.7 seconds	8.8 seconds	0.9 seconds
		Experimental	9.5 seconds	8.7 seconds	0.8 seconds
Shuttle run test	Girls	Control	13 seconds	12.8 seconds	0.2 seconds
		Experimental	12 seconds	11.7 seconds	0.3 seconds
	Boys	Control	12.8 seconds	12 seconds	0.8 seconds
		Experimental	11.9 seconds	11.6 seconds	0.3 seconds
Standing long jump	Girls	Control	143 cm	153 cm	10 cm
		Experimental	161 cm	167 cm	6 cm
	Boys	Control	151 cm	162 cm	11 cm
		Experimental	160 cm	169 cm	9 cm

Comparative analysis of results between initial and final testing for the control and experimental groups showed following aspects.

For height, control group recorded an average increase of 2 cm for both girls (from 148 cm to 150 cm) and boys (from 152 cm to 154 cm). Experimental group had an average increase of 4 cm for boys (from 149 cm to 153 cm) and 5 cm for girls (from 148 cm to 153 cm). This growth is more pronounced compared to the control group.

At weight, the control group, girls increased in weight by 2 kg (from 42 kg to 44 kg), while boys increased by 3 kg (from 38 kg to 41 kg). At experimental group, girls recorded an average increase of 3 kg (from 35 kg to 38 kg), and boys an increase of 2 kg (from 39 kg to 41 kg).

For chest perimeter on inspiration, an increase of 1 cm was observed for girls (from 75 cm to 76 cm) and 3 cm for boys (from 73 cm to 76 cm) at control group. Experimental group recorded an increase of 2 cm for girls (from 74 cm to 76 cm) and 1 cm for boys (from 74 cm to 75 cm).

At chest perimeter on expiration, control group had a significant increase of 6 cm for girls (from 65 cm to 71 cm) and 11 cm for boys (from 69 cm to 80 cm), while experimental group recorded an average increase of 1 cm for both girls (from 68 cm to 69 cm) and boys (from 68 cm to 69 cm).

For chest perimeter elasticity, at control group remained constant for girls (5 cm) and increased by 1 cm for boys (from 4 cm to 5 cm). At experimental group girls

had an increase of 1 cm (from 6 cm to 7 cm), while the boys' average remained constant (6 cm).

At 50m speed run, an improvement of 0.8 seconds was recorded for girls (from 10 to 9.2 seconds) and 0.9 seconds for boys (from 9.7 to 8.8 seconds) from the control group. At experimental group, the improvements were 0.7 seconds for girls (from 9.8 to 9.1 seconds) and 0.8 seconds for boys (from 9.5 to 8.7 seconds).

For "Shuttle" test, an improvement of 0.2 seconds was observed for girls (from 13 to 12.8 seconds) and 0.8 seconds for boys (from 12.8 to 12 seconds) at control group, while at experimental group the improvement was the same (0.3 seconds), for both girls (from 12 to 11.7 seconds) and boys (from 11.9 to 11.6 seconds).

At standing long jump, control group recorded a notable increase of 10 cm for girls (from 143 cm to 153 cm) and 11 cm for boys (from 151 cm to 162 cm). At the experimental group improvements were also recorded, with an increase of 6 cm for girls (from 161 cm to 167 cm) and 9 cm for boys (from 160 cm to 169 cm).

Discussions

The results demonstrate a variable impact of the intervention program on different motor qualities. On one hand, dynamic games were effective in maintaining and, in some cases, improving speed and agility parameters, according to the established objectives. The increased interest and involvement of students in the experimental group during physical education classes, due to the playful nature of the activities, suggests a positive contribution to intrinsic motivation for movement.

However, it is notable that in the standing long jump test, the control group recorded a superior average increase compared to the experimental group. This can be explained by several factors. Firstly, although dynamic games aim for speed, they do not always focus directly on developing the explosive strength of the lower limbs in a way as specific as targeted exercises for this quality (which might have been included more in the control group's routine or in the general routine of standard classes). Secondly, progress in motor tests can also be influenced by the individual pace of growth and development of students in middle school, which is often rapid and heterogeneous, even without specific interventions. It is possible that the general improvement in physical condition, regardless of the specific methods, contributed to the control group's results in this test.

Compared to other similar studies, which highlight the benefits of games in the development of general motor skills and speed, our results confirm the value of the playful approach in physical education. However, they emphasize the need for a balanced strategy that combines the advantages of dynamic games with specific exercises for the development of all motor qualities, including explosive strength. The hypothesis regarding the contribution of dynamic games to speed development is largely confirmed, especially concerning reaction and execution speed in variable contexts. The limitations of the study include the relatively short duration of the

experimental intervention (one school year) and the possible influence of uncontrolled external factors.

Conclusions

Based on the analysis of the data and the observations made, we can state that dynamic games represent an effective and motivating method for developing the motor quality speed in middle school students, contributing to increased engagement and interest in physical education.

The strategic integration of the specially designed motor games demonstrated a positive impact on the reaction speed and agility of students in the experimental group.

Although the control group had a superior evolution in the standing long jump test, this highlights the importance of combining dynamic games with specific exercises to develop explosive strength for a complete and balanced training program.

Motor games not only develop physical qualities but also stimulate cognitive and socio-emotional development, cultivating teamwork, fair play, and the pleasure of movement.

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