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DEVELOPING STRENGTH AND SPEED THROUGH SPECIFIC ATHLETICS METHODS AT THE GYMNASIUM LEVEL – APPLICATIVE STUDY

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Abstract Athletics offers a variety of effective exercises for developing fundamental motor skills: strength and speed. By integrating athletics-specific activities into physical education classes, middle school students can benefit not only from improved physical performance, but also from the development of coordination, endurance, and balance. The study looks at the impact of a program based on speed and strength exercises on middle school students. The main goals include picking effective exercises, checking progress through standardized tests, and comparing results between an experimental group and a control group. The proposed program included tests such as 50 m running, 5x5 m shuttle run, 25 m sprint, long jump, push-ups, and trunk lifts for strength. The results showed significant improvements in the experimental group, confirming the effectiveness of well-structured athletic exercises. These contributed not only to increased motor performance but also to promoting harmonious physical development and better health among students. Thus, athletics proves to be a valuable tool in the physical education process at the middle school level.

Introduction: The harmonious physical development of children in middle school requires a comprehensive and tailored approach to basic motor skills. Among these, speed and strength occupy a central place, being recommended in most motor and sports activities, but also in the general process of physical education [3]. According to the authors' study [1, 2], speed is the body's ability to perform motor actions in the shortest possible time. This manifests itself in several forms: reaction speed, execution speed, and movement speed. In support of this classification, the author [18] emphasizes that the development of speed in children must take into account the neurological characteristics of their age. The author Manno (1999), cited by the author [19], argues that speed is closely related to the ability of the central nervous system to quickly transmit motor commands. In the same vein, another

author [6] considers that specific athletic exercises, such as short-distance sprints, are ideal for developing this quality during the school years. According to the author [8], strength is the ability of the neuromuscular system to overcome or resist external resistance. This motor skill manifests itself in several forms: maximum strength, explosive strength, and endurance strength. In the context of middle school, the author [9] recommends developing strength through indirect methods and age-appropriate exercises. The author [16] emphasizes that bodyweight exercises (push-ups, jumps, trunk lifts) are the most effective for middle school students. The author [20] also emphasizes the importance of progressivity and individualization of strength exercises according to the level of training. Athletics provides an optimal framework for training these motor skills. Authors [7] and [12] have shown, through studies conducted in schools, that athletics-specific exercises contribute to a significant improvement in strength and speed in students aged 11–14. The inclusion of speed and strength exercises in the school physical education curriculum has a positive impact on both physical performance and students' self-esteem and social integration [21]. The author [11] adds to this perspective by stating that progress in developing these qualities can be effectively measured using standardized test batteries, which allows the program to be adapted to the needs of each student. To ensure optimal development of speed and strength, it is necessary to constantly monitor students' progress through specific tests, which allow for the adjustment of exercises and training intensity. The involvement of physical education teachers in the selection and correct application of athletics equipment is important to prevent monotony. In addition, promoting a motivational and stimulating environment in physical education classes helps to increase students' interest in physical activities and the development of a healthy lifestyle [5, 7, 10, 13, 14, 15, 16].

Material-method: Hypothesis of the paper: It is assumed that implementing physical education and sports lessons based on athletics-specific exercises, focused on developing strength and speed, will lead to a significant improvement in motor skills speed and motor skills strength among middle school students, with a positive impact on their physical performance and overall health. The main purpose of this study is to analyze the impact of specific athletics exercises on the development of basic motor skills, speed, and strength in middle school students. Objectives of the paper: To identify and select effective athletics exercises for developing strength and speed in middle school physical education classes. To evaluate students' progress following the implementation of these lessons using speed and strength tests before and after the experiment. To analyze the impact of athletics-specific means on students' physical performance, motor coordination, and overall health. Comparison of results obtained between the experimental and control groups. The study was conducted at the "Ion Nistor" Technological High School in Vicovu de Sus, with the aim of developing motor skills such as strength and speed at the middle school level through the use of athletics-specific methods. To carry out the experiment, two

groups were formed, each consisting of 15 students: The experimental group benefited from a special program of athletics-specific exercises designed to develop strength and speed. The control group carried out the usual physical activities, according to the standard physical education curriculum.The experiment was conducted over a period of two models, during physical education and sports classes, through the systematic introduction of exercises and methods adapted to stimulate the development of the two motor skills targeted. At the end of the experiment, the performances of the two groups were compared, based on specific tests, to evaluate the effectiveness of the methods applied to the experimental group. Research methods used in the study: scientific documentation method, observation method, testing method, graphical method, statistical method [9]. Inclusion criteria: Age appropriate for middle school (11–14 years old); Regular attendance of physical education classes at school; Medically fit for moderate and sustained physical effort; Willingness to participate for the entire duration of the experiment. Informed consent from parents/legal guardians and agreement of the student.

Table 1 Means for developing strength and speed

Objectives	Specific Athletics Means	Module I (Weeks 1–7)	Module II (Weeks 8–14)
Strength development	Lifting light weights or using body weight	Vertical jumps (on-the-spot jumps, long jumps)	Jumping and throwing exercises with medicine ball (1–2 kg)
Improving muscle strength of legs, arms, and trunk	Throwing the medicine ball (jumps and throws)	Push-ups, back-lying leg/trunk lifts	Moderate weight lifting and resistance band exercises
	Trunk flexion exercises (e.g., sit-ups, leg raises)	Bodyweight exercises (squats, push-ups, sit-ups)	Strength circuits combined with fast movements (e.g., burpees, jumping jacks)
Speed development	Sprinting short distances (20–30 m)	Sprinting 4 × 20 m	Sprinting 20–40 m with short rest intervals
Improving reaction time and short-distance running speed	Sprinting with direction changes	Acceleration exercises (20 m + 10 m sprint)	Progressive acceleration exercises (from 0 to max speed)
	Zig-zag or serpentine running over short distances	30 m sprints with short rest between sets	Sprinting longer distances (30–40 m), focus on speed and technique
Improving reaction to visual and auditory signals	Quick reaction exercises to auditory signals	Sprinting with direction changes (e.g., zig-zag, straight-line sprints)	Acceleration and deceleration drills over short distances

Module I (Weeks 1-7) - Strength Development: Medicine Ball Jumps and Throws: These exercises help improve strength in the legs and arms, which are essential for developing a strength base. Light Weight Throws and Lifts: Helps increase muscle strength in the core and arms to improve stability and posture. Moderate Weight Strength Exercises: Moderate weight exercises or the use of resistance bands will strengthen the neuromuscular system. Module I (Weeks 1-7) - Speed Development: Short-distance sprints: 20-30 m helps increase reaction speed and develop pure speed. Acceleration exercises: Helps improve acceleration technique, important for athletic performance. Swooping: Improves coordination and control of fast movements. Module II (Weeks 8-14) - Strength Development: Jumping and

Medicine Ball Throws: Continue strength training, but in a more complex way to stimulate muscle growth and explosive strength. Strength Circuit with Quick Movements: Includes burpees and jumping jacks, which are excellent for developing explosive strength and improving quick reaction capacity. Moderate Weights and Resistance Band Exercises: Increase the difficulty and stimulate strength development in a more structured and progressive way. Module II (Weeks 8-14) - Speed Development: Short-Pause Sprints: These exercises help improve reaction times and the ability to maintain high speed over longer distances. Long-Distance Sprints (30-40m): Aim to improve speed performance at maximum speed over a longer distance. Rapid acceleration and deceleration exercises: They will increase speed control and the body's adaptability to rapid changes in speed.

Results: The results obtained following the implementation of the experimental program highlight significant improvements in both strength and speed among students in the experimental group, compared to those in the control group.

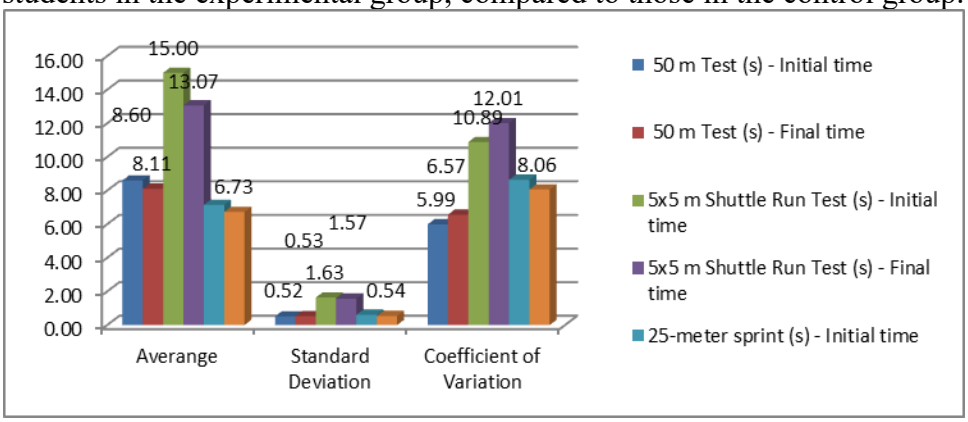

Fig.1 Experimental Group

The data presented highlight the evolution of the students' motor performances in three speed tests: the 50 m run, the 5x5 m shuttle and the 25 m sprint, measured at the beginning and at the end of the experimental program. A decrease in the average times is observed for all three tests, which indicates an improvement in physical performance. For example, the average time in the 50 m run decreased from 8.60 s to 8.11 s, and in the case of the 5x5 m shuttle the decrease is even more pronounced, from 15.00 s to 13.07 s. Similarly, the 25 m sprint, recorded a decrease from 7.15 s to 6.73 s. The standard deviation values are relatively close between the two testing moments, indicating a similar dispersion of the results among the students, both at the beginning and at the end. For the 5x5 m shuttle, the standard deviation is higher compared to the other tests, indicating a greater variability between students in this sample. The coefficient of variability provides a relative measure of dispersion, compared to the mean of the results. In all cases, the coefficient is higher for the final tests compared to the initial ones, which may indicate a slight increase in the

variability of the results following the experimental program. However, the values remain below 15%, which suggests an acceptable homogeneity of the group.

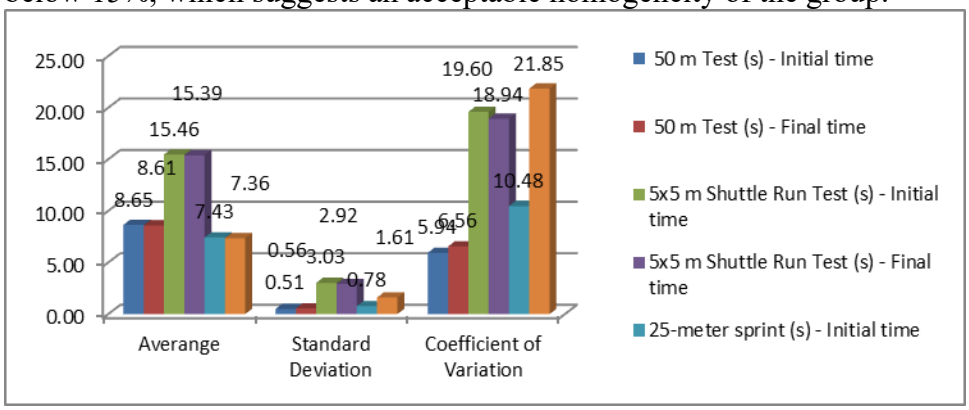

Fig.2 Control Group

The data reflect the results of three speed tests in students, recorded at the beginning and end of a monitoring period. The average times show a slight decrease for all three tests, indicating a marginal improvement in performance. Thus, the average time for the 50 m run decreased from 8.65 s to 8.61 s, for the 5x5 m shuttle from 15.46 s to 15.39 s, and for the 25 m sprint from 7.43 s to 7.36 s. The standard deviation is relatively constant for the 50 m run and the 5x5 m shuttle, indicating a similar dispersion of results between students at both testing times. In the case of the 25 m sprint, the standard deviation increases significantly from 0.78 to 1.61, suggesting a greater variation in performance between students at the end. The coefficient of variation indicates a high relative variability especially in the 5x5 m shuttle (approximately 19-20%) and in the 25 m sprint in the final test (over 21%). This shows that although the average performance improved slightly, the response of the students to the training was different, with some achieving greater progress, others less. In the 50 m run, the variability remains low and stable.

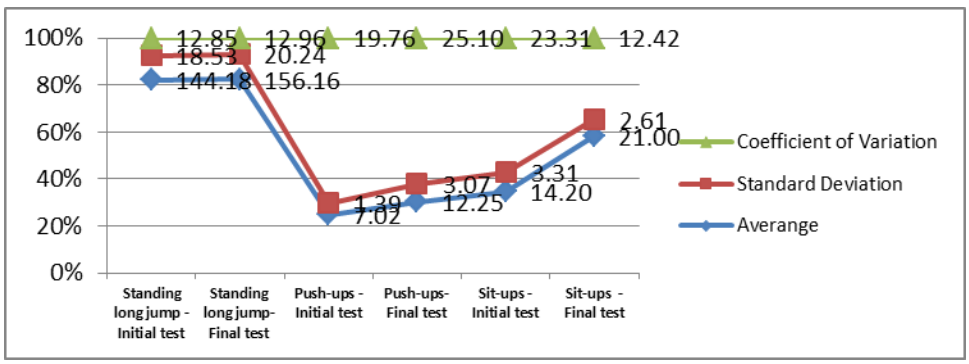

Fig.3 Experimental Group

The data reflect the results of the strength and jump tests in students, measured at the beginning (initial test) and at the end (final test) of the experimental program. A

significant increase in the average performances is observed in all three tests: The long jump from the spot increases from 144.18 cm to 156.16 cm, indicating an improvement in explosive strength and muscular capacity. Push-ups have a notable progress, the average increasing from 7.02 repetitions to 12.25, which shows an important development of the muscular strength of the upper limbs and trunk. Trunk lifts register an increase from 14.20 to 21 repetitions, signaling an improvement in the strength of the abdominal muscles. The standard deviation increases slightly in the long jump and push-ups, which indicates a slightly greater variability among students after training. In the case of trunk lifts, the standard deviation decreases, suggesting a homogenization of the results at the end. The coefficient of variability remains relatively stable for the long jump (approximately 13%), indicating moderate, constant dispersion. For push-ups, the coefficient increases significantly, from almost 20% to over 25%, suggesting greater differences between students in terms of progress in this exercise. For deadlifts, the coefficient decreases considerably, showing a uniformity of performance in the group.

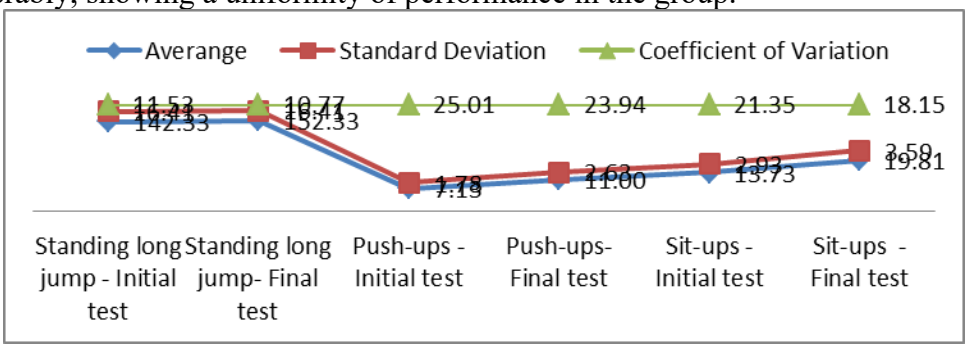

Fig.2 Control Group

The data represent the students' performance on the strength and jump tests, measured at the beginning (initial test) and at the end (final test) of the experimental program. The mean on the Long Jump test shows an increase from 142.33 cm to 152.33 cm, indicating an improvement in explosive strength and muscular capacity. The push-ups progress from 7.13 repetitions to 11 repetitions, indicating a notable development of muscular strength in the upper body. The mean on the Trunk Lift test increases from 13.73 to 19.81 repetitions, showing an improvement in abdominal muscle strength. The standard deviation on the Long Jump remains constant at 16.41 cm, suggesting a similar dispersion of performances among the students both at the beginning and at the end. For push-ups, the standard deviation decreases slightly from 1.78 to 2.63, indicating a slight increase in the variability of the results, but not significant. In deadlifts, the standard deviation increases from 2.93 to 3.59, which shows a greater variability in student performance after the experimental program. The coefficient of variability decreases slightly in the long jump, from 11.53% to 10.77%, indicating a slight uniformity of performance. For push-ups, the coefficient decreases slightly from 25.01% to 23.94%, suggesting some homogenization of the

group, although the variability remains high. Deadlifts register a more significant decrease in the coefficient, from 21.35% to 18.15%, indicating a better uniformity of results in this exercise.

Discussions: In the authors' work [4], physical education is essential in the training of students, being the only discipline that ensures the balance between intellectual and physical effort, supporting harmonious development. Starting from the fact that middle school students have a low level of speed, the hypothesis is that through specific exercises and games this motor quality can be improved, thus contributing to the general progress in physical education. In another work [17], there are various methods for developing strength, and the hypothesis was that a weekly training program improves performance in tests for the chosen muscle groups. The research involved 32 participants, conducted over 14 weeks (12 training and 2 evaluation). The progress was more visible in the deltoids and arms, and the resulting differences are due to individual characteristics and group composition.

Conclusions: Athletics-specific exercises contribute significantly to improving speed and strength in middle school students. The experimental program led to more obvious progress compared to regular physical activities, both in speed and strength tests. Adapting exercises to the particularities of age and level of training is recommended for the harmonious development of motor skills. Constant monitoring and diversification of training means stimulate students' motivation and support physical and mental progress.

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