The Annals of the "Ştefan cel Mare" University of Suceava.
Physical Education and Sport Section. The Science and Art of Movement
eISSN 2601 - 341X, ISSN 1844-9131

ANALYSIS OF THE PROCESS OF DEVELOPMENT OF MOTOR QUALITIES USING SPECIFIC MEANS OF ATHLETICS IN NATURAL CONDITIONS

***Bosînceanu Adrian*[1]**
***Vizitiu Elena*[2]**
"Vasile Tomegea" Secondary School, Suceava[1]
Email adress [1] bossuady@yahoo.com
"Stefan cel Mare" University of Suceava[2]
Email adress[2] elenav@usm.ro

Keywords: analysis, students, means, athletics, evaluation

Abstract The analysis of the development of motor qualities by applying specific means of athletics in natural conditions is an important approach in the field of physical education and sports. Hypothesis of the work: it is assumed that the use of athletics-specific means in natural environments could have a positive impact on the development of students' motor skills, thus contributing to the improvement of their athletic performance. The aim of the paper is to investigate and evaluate the development of motor qualities, such as speed and strength, in secondary school students, using methods and means specific to athletics. Study objectives: To assess how the application of athletics-specific means in natural environments influences the development of students' motor skills; Evaluation of the improvement of the speed and strength level of students following the application of these means; Comparison between the progress made by students involved in this type of lessons and those who followed traditional means in terms of improving speed and strength. Thus, the numerical data support the conclusion that the Experiment Group had significant and consistent improvements in physical performance compared to the Control Group in most tests. The integration of varied terrains and natural conditions into physical education lessons allows students to adapt to different environments, thus developing increased adaptability and resilience.

Introducere: In the literature there are various methods and means specific to athletics that can be adapted and applied in natural conditions to improve student performance. Physical education lessons in varied terrain: Running or performing strength and agility exercises on varied natural terrains (such as hills, forests, beaches or hiking trails) can improve the stamina and adaptability of middle school students. Practicing speed over various distances and performing jumps (such as jumping on natural obstacles or over slopes) in the natural environment can develop speed, agility and strength of the legs. Lifting and throwing natural objects (such as rocks or logs) or using resistance provided by the terrain (such as running on sand or rough terrain) can strengthen muscles and improve strength. Practicing running or balance

exercises on uneven terrain or on natural surfaces (such as rocky or rough terrain trails) can improve coordination and the ability to adapt to varied conditions. Running on natural trails, climbing hills or cliffs, using tree trunks for traction or pushing exercises - all these can be effective means of developing strength and endurance. Planning physical education lessons that focus on adapting to natural conditions (such as wind, rain or temperature changes) helps students improve their mental stamina and adapt to variability in competition conditions or assessment tests. Speed, in the context of motor skills, is the ability to perform fast and efficient movements within a given time frame. This involves not only the execution of simple movements, but also the ability to perform a series of coordinated movements to accomplish a motor task in the shortest possible timeframe, taking into account the specific requirements of each action. Often, speed is defined as the ability to perform fast and coordinated movements, including being able to move rapidly or perform various motor actions with a high cadence. The conceptual delineations of these motor qualities concern the anatomical, physiological and biomechanical aspects underlying the performance and development of these capacities. Precise understanding of these aspects is essential for designing physical education programmes, assessing performance and maximising potential in the context of physical education and sport activities. From specialized sources, strength is defined as the ability of the human body to make efforts to overcome, maintain or succumb to internal or external resistance, through the contraction of one or more muscle groups [1, 3, 7, 8, 9, 12,13, 15]. "In the context in which technology evolves at a rapid pace, we ask ourselves the question of whether it matters what kind of mentality we have and whether we can change it to improve the instructive-educational process. Theoretical and empirical studies show us that a teacher's professional mentality is determined by personality, how he sees others and how he sees himself." [11].

Material-method: The hypothesis of the paper assumes that the use of athletics means in natural environments could have a positive impact on the development of students' motor skills, thus contributing to the improvement of their athletic performance. The aim of the paper is to investigate and evaluate the development of motor qualities, such as speed and strength, in secondary school students, using methods and means specific to athletics. Study objectives: To assess how the application of athletics-specific means in natural environments influences the development of students' motor skills; Evaluation of the improvement of the speed and strength level of students following the application of these means; Comparison between the progress made by students involved in this type of lessons and those who followed traditional means in terms of improving speed and strength. Research methods: method of literature analysis, tests, pedagogical observation, mathematical-statistical, tabular and graphic [10, 14]. Evaluation tests used in the study: Japanese test, 5x10 meter shuttle, 50 meter run, long jump, push-ups and trunk

lift from dorsal decubitus. In the research, the subjects involved are seventh grade students of the "Vasile Tomegea" Secondary School in Suceava County. These students show good psychomotor health, having normal physical qualities and harmonious development. The experiment group and control group were both composed of 6 boys and 8 girls. The experimental group followed an exercise program conducted by me, using specific means of athletics in natural and improvised conditions. Instead, the control group followed a traditional program of methods, without the involvement of means specific to athletics in natural conditions. This approach to the research allowed to compare the effectiveness and impact between the use of athletics in natural and improvised conditions and the traditional method, thus evaluating the different results obtained in terms of the development of motor qualities, especially speed and strength, in students in these groups. Systematization and description of the means used examples: Execution of running on the spot at maximum speed for a period of 10 seconds. Dosage: 3 sets of one repetition, with a 30-second break between repetitions; Achieving accelerated running over a variable distance between 15 and 20 meters. Dosage: 3 sets of one rep, with a 30-second break between reps [2, 5, 6]. For arm strength: Throwing with two hands the filled ball of 0.5- 1-1.5 kg (dosage-2-3 repetitions): Propelling the ball with both hands from chest level, keeping the feet on the same line or with one foot in front.; Throwing the ball with both hands from ground level forward. For leg strength we applied the following exercises: Jumping from the spot with simultaneous detachment from both legs, including variants with different movements executed during the flight, such as shearing or detaching and spreading the legs; Long jump without the use of prior momentum [2, 4, 5].

Results: In the next part, the results of initial and final tests of subjects from the experimental group and control group are presented. To illustrate the differences between the two tests, graphs are attached for each test applied to the groups in the study.

Table 1. Initial and final results of subjects of the experimental group Naveta 5x10m

	Japanese Test (sec)			Shuttle test 5x10m (sec)			50 m distance running (sec)		
	T.I.	T.F.	D	T.I.	T.F.	D	T.I.	T.F.	D
X Averange	16.95	14.90	2.05	21.02	19.73	1.28	8.88	8.48	0.40
S Standard deviation	2.49	2.15	0.73	1.51	1.32	0.43	0.27	0.28	0.14
Cv% Coefficient of variation	14.66	14.44	35.81	7.18	6.70	33.38	3.08	3.34	35.36
r correlation coefficient		0.96			0.96			0.87	
Max	21.52	18.45	35.81	24.56	22.60	33.38	9.40	9.10	35.36
Min	11.89	10.70	0.47	19.25	18.24	0.80	8.20	7.90	0.20
R=Max-Min	9.63	7.75	35.34	5.31	4.36	32.58	1.20	1.20	35.16

Japanese Test – The average time is about 16.95 seconds. The variability of the data is quite high, having a standard deviation of 2.49 seconds. CV%: The relative variability of results is approximately 14.66%, indicating some dispersion of results

relative to the mean. Commute 5x10m- The average time is about 21.02 seconds. The variability of the data is less than in the Japanese Test, with a standard deviation of 1.51 seconds. CV%: The relative variability of results is approximately 7.18%, lower than in the Japanese Test, indicating less dispersion of results relative to the mean. 50m Distance Run – The average time is about 8.88 seconds. Data variability is lowest in this test, with a standard deviation of 0.27 seconds. CV%: The relative variability of results is approximately 3.04%, indicating very little dispersion of results relative to the mean.

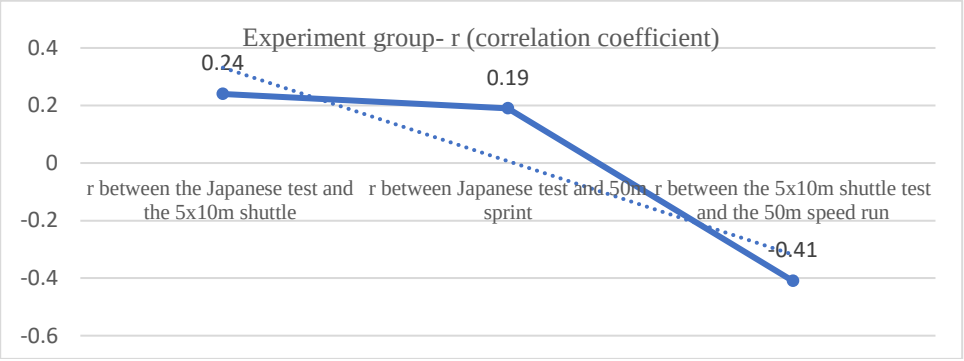

Fig. 1 Correlate between tests

Correlation (r) between Japanese test and 5x10m (TF) shuttle (0.24): This correlation indicates a weak association between Japanese test results and 5x10m spacecraft. With a correlation coefficient of 0.24, there is a positive relationship, but this is considered to be weak; r between Japanese test and 50m (TF) speed run (0.19): This correlation coefficient also indicates a weak association between the results of the Japanese test and those of the 50m speed run. With a value of 0.19, the correlation is weak and suggests a positive but very small relationship; r between 5x10m shuttle test and 50m (TF) speed run (-0.41): This correlation coefficient indicates a moderate to strong and negative correlation between 5x10m and 50m speed running results. With a value of -0.41, it suggests that, in general, 5x10m commute results tend to be inversely proportional to those of 50m speed running.

Table 2. Initial and final results of control subjects

	Japanese Test (sec)			Shuttle test 5x10m (sec			50 m distance running (sec)		
	TI	TF	D	TI	TF	D	TI	TF	D
X Averange	18.81	18.17	0.64	21.84	21.13	0.71	9.33	9.01	0.32
S Standard deviation	1.85	1.64	0.47	1.07	0.82	0.47	0.36	0.36	0.15
Cv% Coefficient of variation	9.83	9.01	73.96	4.90	3.87	66.31	3.90	4.00	45.69
r correlation coefficient		0.97			0.91			0.92	
Max	22.58	21.34	1.55	23.78	22.34	1.44	9.90	9.50	0.70
Min	15.87	15.54	0.01	20.22	19.67	0.09	8.90	8.50	0.20

R=Max-Min	6.71	5.80	1.54	3.56	2.67	1.35	1.00	1.00	0.50

The Japanese-Average test result is 18.81 seconds with a standard deviation of 1.85 seconds. This indicates a moderate dispersion of data around the mean. The coefficient of variation is 9.83%, which suggests relative consistency in test results. The difference between the maximum and minimum value) is 6.71 seconds, indicating quite a variation between the best and worst results. Commute 5x10m-The average result is 18.17 seconds with a standard deviation of 1.64 seconds. This indicates a dispersion similar to the Japanese Test, but with a somewhat lower mean value. The coefficient of variation is 9.01%, which suggests a consistency comparable to the Japanese Test. The interval is 5.80 seconds, a variation similar to the Japanese Test. 50m Distance Run – The average result for the 50m Distance Run is 21.13 seconds, with a standard deviation of 0.82 seconds. This indicates less dispersion and a tighter concentration of results around the mean. The coefficient of variation is 3.87%, significantly lower than the other two tests. This indicates greater consistency in the results of this test. The interval is 2.67 seconds, indicating less variation between the best and worst results compared to the other two tests.

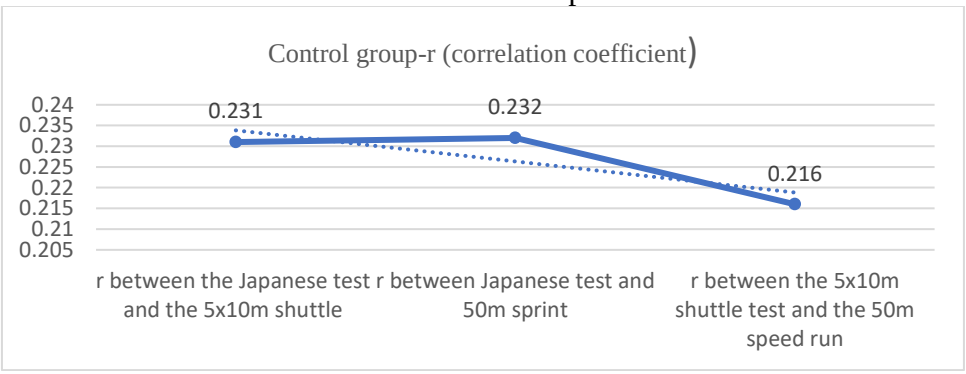

Fig.2 Correlate between tests

Correlation coefficient (r = 0.231) between Japanese test and shuttle 5x10m: This coefficient indicates a moderate positive correlation between Japanese test results and 5x10m shuttle results. However, the correlation is quite weak, and the link between these two tests is not very strong.

Correlation coefficient (r = 0.232) between the Japanese test and the 50m speed run:Here, we also observe a positive correlation, similar to that between the Japanese test and the 5x10m shuttle. However, the correlation coefficient is approximately the same value, indicating a moderate and similar association between the results of the Japanese test and those of the 50m speed run. Correlation coefficient (r = 0.216) between 5x10m commute and 50m speed run: Here we observe a lower positive correlation than the other two pairs of tests. The correlation coefficient indicates an association, but less strong, between the results of the 5x10m shuttle and those of the 50m speed run.

Table 3 Initial and final results of experimental group subjects

	Long jump			Push-ups			Lifting the trunk from dorsal lying down 30 sec		
	T.I.	T.F.	D	T.I.	T.F.	D	T.I.	T.F.	D
X Averange	137.64	149.64	12.00	2.21	8.50	6.29	10.79	16.00	5.21
S Standard deviation	11.02	9.91	4.78	0.98	1.45	1.48	1.68	0.89	1.87
Cv% Coefficient of variation	8.01	6.62	39.84	44.18	17.05	23.55	15.58	5.59	35.83
r correlation coefficient		0.91			0.31			0.04	
Max	159.00	168.00	22.00	4.00	11.00	10.00	14.00	18.00	8.00
Min	120	135	0	0	5	4	8	14	2
R=Max-Min	39.00	33.00	22.00	4.00	6.00	6.00	6.00	4.00	6.00

Long jump – The arithmetic mean (X) for this sample is approximately 137.64 cm with a standard deviation of 11.02 cm. This indicates that the average results are around this number, and the variation from the average is about 11 cm. CV% is 8.01%, sucking a relatively small variation compared to the average. Flotările- The average for this test is 12.00 repetitions, with a standard deviation of 4.78 repetitions. This indicates greater variation in results compared to the previous test. The coefficient of variation is 39.84%, which shows a relatively large variation relative to the average. Lifting the trunk from lying dorsally for 30 seconds – The average for this test is 10.79 reps and the standard deviation is 1.68 repetitions. This indicates a moderate variation in results compared to the other tests. The coefficient of variation is 15.58%, indicating a moderate variation from the average. It has been observed that Long jumps appear to have the least variation and coefficient of variation, while push-ups have the greatest variation and coefficient of variation. The data suggests that students performed more consistently on the long jump test compared to the other tests. The variability and distribution of results may suggest aptitude level and consistency in performance in each test.

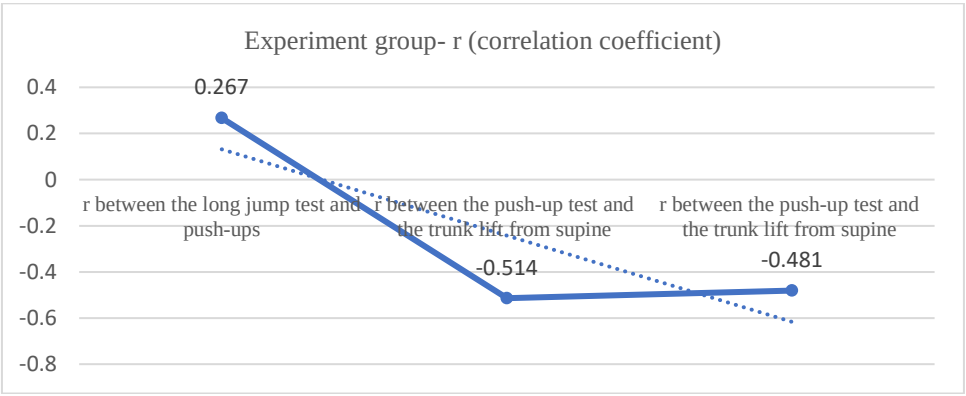

Fig. 3 Correlation between tests

The interpretation of these correlations can be as follows: r between long jump test and push-ups (TF) = 0.267: This correlation coefficient indicates a positive but moderate correlation between performance in the long jump test and performance in

push-ups. The positive value shows a general tendency to increase performance in one test while performance in the other test increases, but the correlation is not very strong; r between push-ups test and trunk lift from dorsal lying down (TF) = -0.514: This correlation coefficient indicates a moderate but negative correlation between push-ups and trunk lift from dorsal lying down. It is a stronger correlation than that observed in the first case and indicates an inverse link between these two tests; r between long jump test and trunk lift from dorsal lying (TF) = -0.481: This correlation coefficient indicates a moderate and negative correlation between long jump and trunk lift from dorsal lying down. Similar to the previous coefficient, this negative value suggests an inverse relationship between these two tests: increased performance in one test is associated with lower performance in the other.

Table 7. Initial and final results of control subjects

	Long jump			Push-ups			Lifting the trunk from dorsal lying down 30 sec		
	T.I.	T.F.	D	T.I.	T.F.	D	T.I.	T.F.	D
X Averange	120.71	126.43	5.71	1.86	3.07	1.21	9.00	11.14	2.14
S Standard deviation	9.58	9.82	3.21	1.02	1.06	0.65	0.97	1.50	1.02
Cv% Coefficient of variation	7.94	7.77	56.23	55.11	34.59	53.61	10.73	13.45	47.76
r correlation coefficient		0.95			0.81			0.74	
Max	139.00	145.00	12.00	4.00	6.00	2.00	10.00	13.00	4.00
Min	102	112	2	1	2	0	7	8	0
R=Max-Min	37.00	33.00	10.00	3.00	4.00	2.00	3.00	5.00	4.00

Long jump – The average result is approximately 120.71 cm with a standard deviation of 9.58 cm. This suggests that average results are around this value, and the variation in individual results is around 9.58 cm around the average. The coefficient of variation is 7.94%, indicating a relatively small variation from the average. Push-ups-The average for the number of reps in push-ups is 5.71 and the standard deviation is 3.21. This indicates greater variation in individual results compared to the average. The coefficient of variation is high, 56.23%, signaling a high variation compared to the average. Trunk lift from dorsal lying for 30 seconds— The average for the number of repetitions in trunk lift from dorsal lying is 9.00, and the standard deviation is 0.97. This indicates less variation in results compared to push-ups. The coefficient of variation is 10.73%, indicating a moderate variation from the average. It is observed that long jumps appear to have the least variation and coefficient of variation, indicating greater consistency in performance compared to the other tests. Push-ups have the greatest variation and coefficient of variation, suggesting greater variation in subjects' performance in this test.

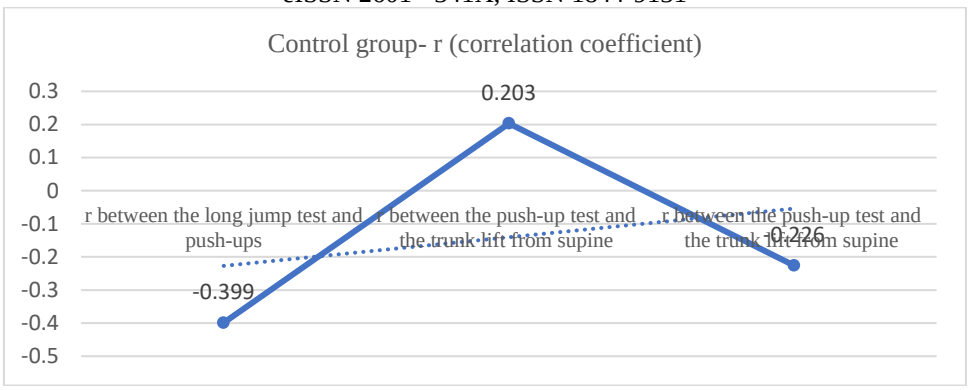

Fig. 4 Correlation between tests

The interpretation of these correlations can be as follows: r between long jump test and push-ups (TF) = -0.399: This correlation coefficient indicates a moderate negative correlation between long jump performance and push-up performance. The negative value shows that there is an inverse association between these two tests; That is, when performance on one test increases, performance on the other test tends to decrease. However, this correlation is not very strong; r between push-ups test and trunk lifts from dorsal lying down (TF) = 0.203: This correlation coefficient indicates a positive but weak correlation between performance in push-ups and performance in lifting the trunk from lying down. Although positive, indicating a general trend of increased performance in both tests, the correlation is rather weak; r between long jump test and dorsal trunk lift (TF) = -0.226: This correlation coefficient also indicates a moderate negative correlation between performance in long jump and performance in trunk lift from dorsal lying down. Similar to the first coefficient, this suggests an inverse association between these two tests.

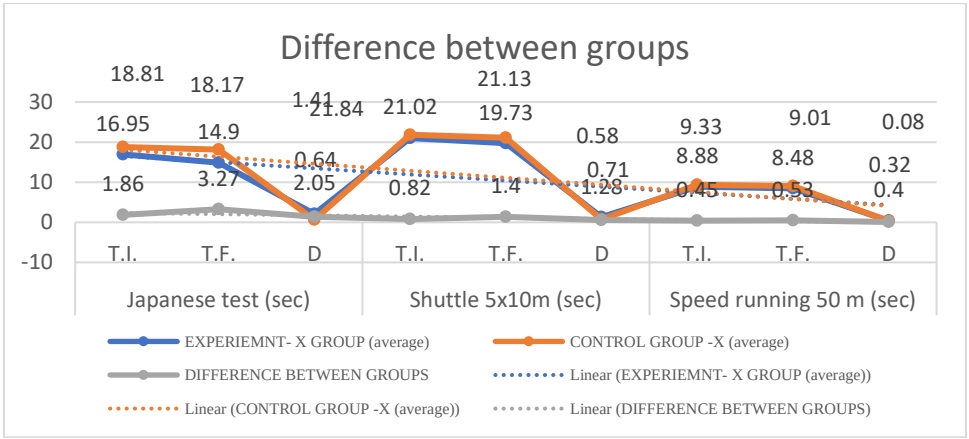

Fig.5 Difference between Experiment Group and Control Group

For the Japanese Test, the Experiment Group shows a difference of 1.86 seconds between the averages of the initial and final times, while the Control Group has a difference of 0.64 seconds; For the 5x10m Shuttle, the Experiment Group shows a difference of 3.27 seconds between the averages of the initial and final times, while the Control Group has a difference of 0.71 seconds; For the 50m Distance Run, the Experiment Group shows a difference of 1.41 seconds between the averages of the initial and final times, while the Control Group has a difference of 0.32 seconds.

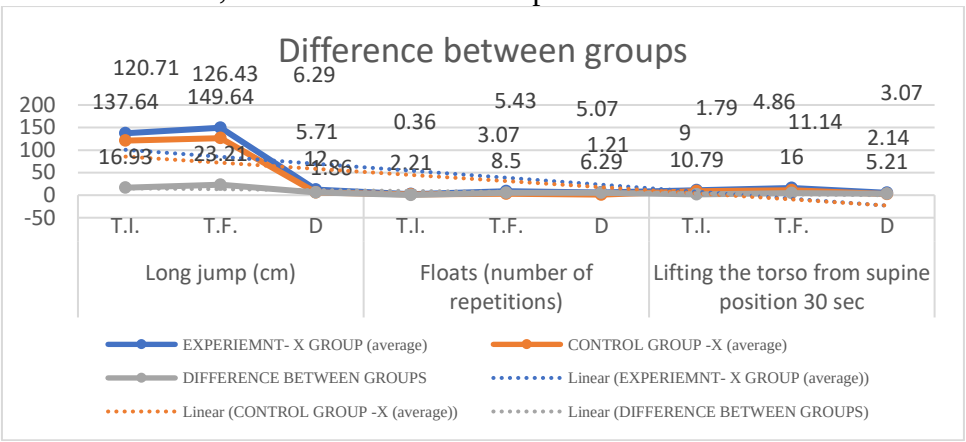

Fig.6 Difference between Experiment Group and Control Group

The experiment group has significantly higher results in all three tests compared to the Control Group. For the long jump, the difference in average between the two groups is 16.93 cm, indicating a significant difference in performance in this test between the two groups. For push-ups and trunk lift from lying dorsally for 30 seconds, differences between averages are also significant and indicate a considerable difference in performance between the two groups. Analysis of differences between groups suggests that the Experiment Group performed significantly better on these physical fitness tests compared to the Control Group.

Discussions and Conclusions: The use of athletics-specific means in secondary school has led to significant improvements in students' physical performance. These means seem to be effective in improving motor qualities such as speed, strength and agility. The Experiment Group showed significant improvements in the Japanese Test, 5x10m Shuttle and 50m Distance Run compared to the Control Group. In terms of specific skills, such as long jump, push-ups, and trunk lift for 30 seconds, the Experiment Group performed significantly better than the Control Group. This suggests that athletics-based exercises helped improve these motor skills in students. In the Japanese Test, the Experiment Group achieved a difference between the averages of the initial and final tests of 1.86 seconds. The Control Group obtained a difference between the averages of the initial and final tests of 0.64 seconds. On the 5x10m shuttle, Group Experiment achieved a difference between initial and final averages of 3.27 seconds. In the Control Group, a difference between the averages of the initial and final tests of 0.71 seconds was obtained. In the 50m

Distance Run, the Experiment Group achieved a difference between the averages of the initial and final tests of 1.41 seconds. In the Control Group, a difference was obtained between the averages of the initial and final tests = 0.32 seconds. Although both groups improved, the difference between the Experiment Group and the Control Group was smaller in this test. These numerical data suggest that applying athletics-specific exercises to the Experiment Group had a significantly greater impact on students' physical performance compared to the Control Group for the Japanese Test and the 5x10m Commute, while the differences were smaller for the 50m Distance Running test. Thus, the numerical data support the conclusion that the Experiment Group had significant and consistent improvements in physical performance compared to the Control Group in most tests. The integration of varied terrains and natural conditions into physical education lessons allows students to adapt to different environments, thus developing increased adaptability and resilience.

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