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Research Results
Резултати от научни изследвания

AFFIRMING WELLNESS CULTURE THROUGH INNOVATIVE METHODOLOGY RELATED TO BLAZE-POD TRAINER SYSTEM

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Abstract. The present material brings out theoretical foundations with an emphasis on development of motor potential and specificity in motor qualities. The following are tracked: scientific status in teaching methodology of physical education and sports in initial stage of basic educational level, educational standards for development of motor quality and agility. Technology for development of motor quality and agility with aim of increasing motor capacity has been approved. Statistical verification of effectiveness of a tested technology is presented with following: organization of experimental work, ascertaining, training, and control stage. Scientifically based conclusions and generalizations are drawn. The purpose of study is to establish and assess presence of Wellness Culture[1] in primary education by applying an innovative methodology for development of motor quality agility and increasing motor capacity of students from initial stage of basic education level by testing an innovative methodology in training of PES[2], consisting of an author's set of motor exercises related to Blaze-Pod Trainer System[3] and checking its effectiveness in practice.

Keywords: motor capacity; motor activity; motor potential; Wellness culture in Bulgarian primary school

Introduction

In order to establish development of Wellness culture through innovative methodology, the selection of an up-to-date toolkit for control and assessment of dynamics of tracking indicators for motor capacity and motor activity is decisive. It must be objective and allow representation of standard. Normative requirements traditionally have dynamic nature, allowing change according to social conditions, and current needs, and are harmonized with legislative changes and normative documents for field of physical culture. The educator has opportunity to select tests for establishing level of motor capacity and for an optimal assessment regarding motor activity of students (Veselinov 2021). Leading factors in selection of instrumentation are environmental

conditions, possibility of operational assessment, comparability of results, and ontogenetic selection of intervals in motor load. The received control and assessment information is an objective guide for dynamics of indicators in primary education regarding motor activity in establishing motor potential and proving effectiveness and presence of Wellness culture. Numerous leading authors conduct research in this area to prove effectiveness of Recreational and Wellness programs, products, and services (Ivanova 2019; 2019a; Dimitrova 2019; Ignatova & Iliev 2022, 2020). Among all of them, programs and Wellness have highest social impact, ensuring sustainability of students' health (Dimitrova 2019a; Ignatova 2020). Recreational and Wellness innovative methods, exercise programs, and complexes of exercises aimed at balancing motor potential, effective motivation and motor activity of young people around the world are being sought (Dimitrova 2020, 2019a). Modern needs imply personal motivation to activate Wellness culture and sports for health (Ignatova & Iliev 2022, 2020).

Methodology

The experimental study aims to establish development of motor quality agility, as well as level of motor capacity. The subject of the analysis are indicators allowing harmonization and individualization of differences in motor potential between experimental and control groups and establishing effectiveness of applied technology. Scientifically based conclusions will allow establishing presence or absence of Wellness culture in Bulgarian primary school. The object is specific indicators measured by objective and reliable tools, as well as their systematization and analysis. In period from 01.09.2021 to 30.05.2022, a measurement of motor potential of elementary school students at basic educational level was carried out. To derive a relationship between indicators, an analysis of dynamics was applied through mathematical-statistical processing to derive variation and correlation coefficients. The object of the experimental study are 44 students, aged 9 – 10 years, divided equally into two target groups (22 per group0: experimental group (EG) and control group (CG). The implementation of innovative technology took place within nine months during academic year 2021/22.

Main material of the research and its discussion

The methodological basis of study is based on a scientific philosophy of an applied nature and aimed at improving a specific educational and sports practice. According to nature and essence of goals, research is constative in its diagnostic part and innovative in its part – application of targeted experiment.

Research hypothesis: if technology is applied to develop motor quality of agility, it will increase level of motor capacity in the studied contingent.

The research methods are:
– Theoretical analysis
– Pedagogical experiment
– Testing
– Mathematical and statistical methods

The purpose of study was to establish and assess presence of Wellness culture in primary education by applying an innovative methodology for development of motor quality agility and increasing motor capacity of students from initial stage of basic educational level in PES training, consisting of an author's complex of motor exercises and to check its practical effectiveness.

Tasks:

– study development of motor quality agility and increase motor capacity according to literature sources.
– conducting the experiment
– comparative analysis of empirical data between first and second testing
– formulation of scientifically based conclusions and practical recommendations

The subject of the analysis is the indicators allowing harmonization and individualization of differences in motor potential between experimental and control groups and establishing the effectiveness of applied methodology. Scientifically based conclusions will allow establishing the presence or absence of Wellness culture in Bulgarian primary school. The object is specific indicators measured by objective and reliable tools, as well as their systematization and analysis. In the period from 01.09.2021 to 30.05.2022, motor capacity of students from initial stage of basic educational level was measured. In order to derive a relationship between indicators, an analysis of dynamics was applied through mathematical-statistical processing to derive coefficients of variation and correlation. The correlation coefficient of studied indicators was obtained with capabilities of program: Excel – Data – Data Analysis – Correlation. The correlation coefficient is expressed by Pearson's index. The object of the experimental research are 44 students aged 9 – 10 years, who we divided into two groups: experimental (EG) and control (CG). Thus, two unique target groups with 22 students were formed. The gender ratio was equally distributed. The application of the innovative methodology took place within nine months during academic year 2021/22. Students' parents participating in experiment were informed and signed declarations of informed consent to participate in study and regarding publication of measurement data in our scientific analyzes and developments.

Results

Mathematical and statistical analysis.

Table 1. Variation analysis EG/CG – start/end

Test	Group/ Stage	Min	Max	R	Av	Me	Mo	S td	V%
Motor capacity/ points	EG/start	7	16	9	11,45	11	14	2,86	8,16
	KG/start	10	15	5	12,18	12,5	14	1,65	2,73
	EG/end	16	19	3	18,23	18	19	0,87	0,76
	KG/end	15	19	4	16,66	17	17	1,14	1,29
Agility/ seconds	EG/start	13,14	21,38	8,24	15,76	15,06	14,19	2,37	5,64
	KG/start	12,89	19,52	6,63	15,63	15,78	16,09	1,59	2,52
	EG/end	12,69	17,13	4,44	14,16	13,92	12,97	1,17	1,38
	KG/end	13,12	19	5,88	15,62	15,35	19	1,48	2,19

From the data in table 1, it is clear that results of EG for motor capacity after applying author's complex have increased from a “Good” rating to an “Excellent” rating. According to statistical value – weighted average (Av), indicator – motor capacity for EG from beginning is 11.45, which corresponds to a “Good” rating, and for CG it is 12.18, which is also a “Good”rating. According to statistical value – a weighted average indicator – motor power at end of EG is 18.23, which corresponds to an “Excellent” rating, and at CG for same value it is 16.66 – “Very good” rating. From data in same table, it is clear KG scores for motor capacity at end of study marked an increase from “Good” to “Very good”. The results at beginning of EG have a smaller range of 3 points compared to results at beginning of CG – 4 points. Max in results for motor capacity in EG at end of study is 16 points. For same statistical indicator at CG at end of study – 15 points. At the beginning of experiment, the results of maximum motor capacity for both target groups were 19 points. We observe a significantly better Minimum result with EG at beginning of 16 points compared to EG at the end of study with a difference of 7 points. between minimum score in CG at beginning and end was 15 points.The median (Me) of motor capacity scores for EG at beginning of study was 11 points and same indicator at end was 18 points compared to CG, which at end of testing is 12.5 points, and at beginning of testing is 17 points. The median is value that lies in middle of statistical series. Me is value at which half of diagnoses of two target groups at beginning of study fall into the "Good" rating scale, while at end of experiment half of EG fall into “Excellent” rating scale and half of CG at beginning of research fall into rating scale “Very good”. The studies of both target groups throughout studied period were unimodal. The module (Mo) for results of two target groups at beginning was 14 points, and at end it was 19 points for EG and 17 points for CG, a decline was registered. In highest value for both target groups at beginning of research period, they fall into rating scale “Good” according to indicator – motor capacity. At beginning of

training in CG, they are at the highest level in rating scale “Very good”, and after testing author's complex in EG, they are at highest level in scale – ‘Excellent” rating. The standard deviation (Std) for EG at the beginning of the study was 2.86 points and was greater than the (Std) for CG at the end of the study, which was 1.65 points. The standard deviation of the post-test EG is 0.87 points and is less than the (Std) of the CG at baseline, which is 1.14 points. The standard deviation is a measure of the deviations of the values of a distribution from their mean. The more – the larger the standard deviation, the wider the spread of values. The smaller the standard deviation, the more narrowly the values in the data set are spread. This means that the variance in the motor potential study in the EG at the end of the study was greater than the variance in the CG for the same period of the study. The variation (V%) in EG at the beginning has the highest percentage – 8.16% compared to CG for same period – 2.73%. The variation in CG at the end of the study is 1.29%, compared to variation from EG after applying the innovative methodology, which is 0.76%. The coefficient of variation gives information about variance of trait, expressed as a percentage, allowing variation of different traits to be compared. This is also a starting point in assessing homogeneity of sample.

After implementation of innovative technology, EG showed extremely high uniformity of sample compared to end of study and compared to the CG sample for both studies. According to weighted average (Av) for EG at beginning of studied period it was 15.76 sec., and for CG it was similar to an average result of 15.63 sec. As for same magnitude of EG at end of experiment, it notes growth – 14.16 seconds. At CG, result kept its values at end of study of 15.62 seconds, similar to initial ones. The swing (R) at EG at beginning is 8.24 sec, and at CG – 6.63 sec. The swing at CG at beginning is less by 1.61 sec. compared to sweep of EC results at end. The results after approved author's complex at EG are smaller (R) than 4.44 sec. in comparisons with range of results at CG- 5.88 sec. A difference of 1.44 seconds was found. In swing (R), a change in favor of EG is reported. The best result for EG agility at beginning of experiment was 13.14 sec., which improved at end of study period to 12.69 sec. The worst EG agility score achieved at beginning of study was 21.38 sec., which significantly improved after approved author's complex at 17.13 sec. While the worst score for motor quality agility at CG remains almost unchanged at beginning with a value of 19.52 sec., and at end – 19 sec. The median (Me) for EG at beginning was 15.06 sec., and after approbation it reported an improvement – 13.92 sec. compared to (Me) at CG, which is 15.78 seconds at end and 15.35 seconds at beginning.

The studies of two target groups for motor quality agility at beginning and end of follow-up period are unimodal. The mode (Mo) for EG at beginning is 14.19 s, while for CG it is 16.09 s. The mode for motor quality agility at EG improves after

application of author's complex at 12.97 sec., that is an improvement in result by 1.22 sec is reported. The mode of motor quality agility scores at CG deteriorates as a result of 16.09 sec. in beginning. Result of 19 sec. at start, registered a 2.91 second deterioration. The standard deviation of motor quality agility test at end of EG was 2.37 sec. and is greater than (Std) in study for same indicator at CG at end of study – 1.17 points. The standard deviation for motor quality agility in EG after approbation is 1.17 points and is less than (Std) in CG at beginning of study – 1.59 sec. At end of studied period, an improvement of 1.48 seconds was reported, with 0.11 seconds. Dispersion in study of motor quality agility at EG at end of study is greater than dispersion of same motor indicator at CG at beginning and end of research period. After approved author's complex, dispersion in study of motor quality agility in EG is least compared to same statistical indicator in study of same motor indicator in CG throughout study. The variation when studying motor quality agility at EG at beginning of experiment is highest percentage – 5.64% compared to variation for studying same indicator at CG at end of research period, which is 2.52%, in comparison with variation in CG at beginning of study – 2.19% and especially in comparison with data in EG after testing author's complex – 1.38%. An improvement of 4.26% was registered for uniformity of sample of tested contingent in EG regarding agility at end of tracked period. The study of indicator – motor quality agility at EG after approved author's complex shows a high uniformity of sample compared to beginning and compared to sample at CG for two stages of research.

Correlation analysis proves interdependencies between studied indicators. The coefficient of linear correlation between variables X and Y for sample data is obtained by formula:

$$r = \frac{n\sum XY - \sum X \sum Y}{\sqrt{[n\sum X^2 - (\sum X)^2] \cdot [n\sum Y^2 - (\sum Y)^2]}}$$

Table 2. Dependence – motor capacity and motor quality agility

N	Motor capacity – X	Agility – Y	XY	X^2	Y^2
1	16	12,97	207,52	256	168, 2209
2	19	13,21	250,99	361	174,5041
3	18	13,4	241,2	324	179,56
4	19	13,48	256,12	361	181,7104
5	19	12,85	244,15	361	165,1225
6	19	13,92	274,17	361	193,7664

7	19	14,13	268,47	361	199,6569
8	17	14,57	247,69	289	212,849
9	18	14,55	161,9	324	211,7025
10	18	15,97	287,46	324	255,0409
11	17	15,52	215,73	289	240,8704
12	19	16,19	307,61	361	262,1161
13	17	12,69	215,73	289	161,0361
14	18	14,12	254,16	324	199,3744
15	18	12,97	233,46	324	168,2209
16	19	13,91	265,43	361	193,4881
17	18	13,88	249,84	324	192,6544
18	19	13,90	264,1	361	224,4004
19	18	14,98	269,64	324	224,4004
20	19	14,05	266,95	361	197,4025
21	18	13,2	237,6	324	174,24
22	19	17,13	325,47	361	299,29
∑	∑X = 401	∑Y =311,59	∑XY=5545,39	$\sum X^2$=7325	$\sum Y^2$=4311,406

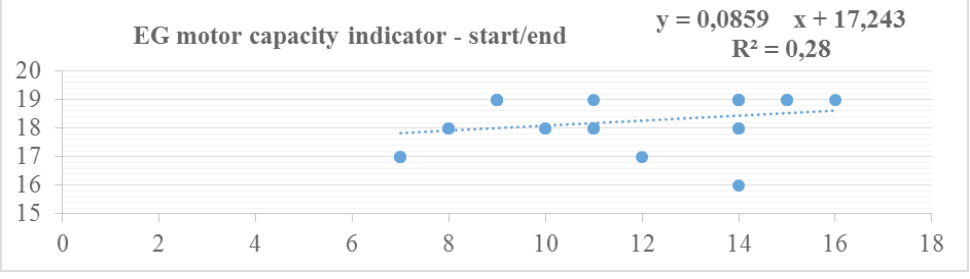
$$r = \frac{22 \cdot 5545{,}39 - 401 \cdot 311{,}59}{\sqrt{(22.7325 - 401.401).(22.4311{,}406 - 311{,}59.311{,}59)}} =$$

2949,01/2149,99078=1,371638

We compare on interpretation scale of correlation coefficients and find: between established improvement of motor capacity and excellent results for motor quality agility, at end of studied period, related to Blaze-Pod Trainer System there is a very high correlation. It is important to note that this relationship is not necessarily causal, it is the values of one variable – in this case, excellent results for development of motor quality agility after application of author's complex, to depend on or be a consequence of values of other – improving motor capacity of studied contingent. Causation can only be revealed in context of specific variables and is not addressed by statistics.

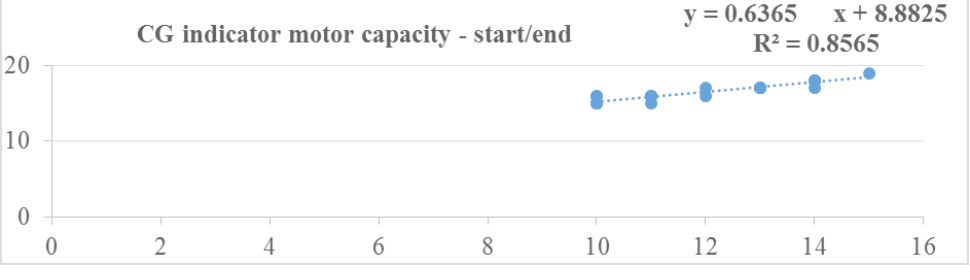
Group homogeneity was found when testing for motor capacity level at EG at beginning of experiment, in contrast to inhomogeneous group at end of study. The correlation coefficient R2=0.28 shows a moderate dependence of motor capacity on EG after applied author's complex (diagram 1).

Diagram 1. Established values dispersion indicator – motor capacity – EG – start/end



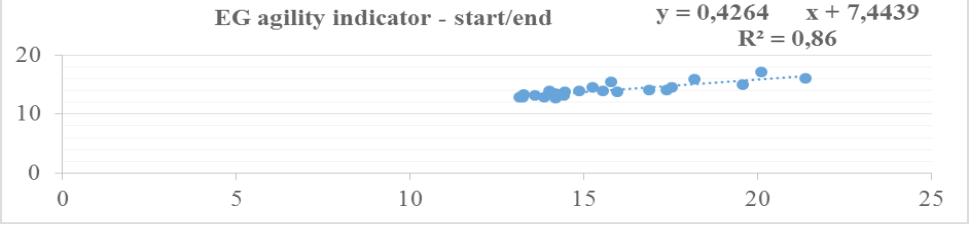
The non-homogeneous group of study contingent was found when testing for level of motor capacity at CG in both stages of study and a significant correlation between results of motor capacity from CG and for both stages of the study with a correlation coefficient R2 = 0.86 (diagram 2) .

Diagram 2. Established values dispersion indicator – motor capacity – CG – start/end



Homogeneity of EG was established when testing for motor quality agility at beginning of experimental study in contrast to testing conducted at end of study.

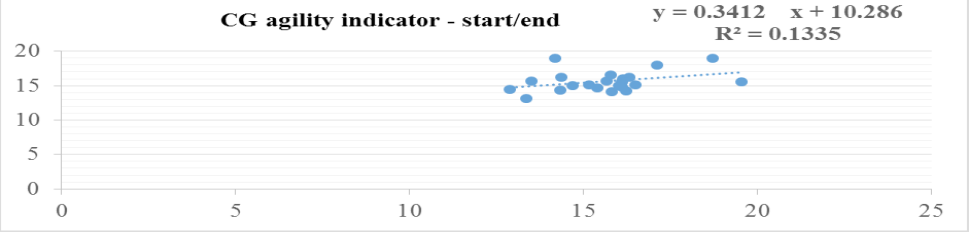
Diagram 3. Established values dispersion indicator agility – EG – start/end



The correlation coefficient R2=0.86 shows a significant dependence in development of motor quality agility in EG after applying author's complex of motor exercises (diagram 3).

An inhomogeneous group was found in testing of CG for motor quality agility in both stages of study and a weak correlation with coefficient R2=0.13 between results at beginning and end of experimental study for CG (diagram 4).

Diagram 4. Established values dispersion indicator agility – CG – start/end



A straight linear relationship with a high correlation coefficient was established between tracked indicators of motor activity and established excellent results for development of motor quality agility and level of motor capacity at EG, after application associated with Blaze-Pod Trainer system. The recorded result proves a marked interrelation with a high correlation found between motor quality agility and level of motor capacity. The Pearson correlation coefficient requires that two variables be measured on metric scale. The number of measurements used to determine correlation coefficient does not affect value of coefficient (except for n = 2, when two points define a straight line and in this case R2 = |1|), (diagram 5).

Diagram 5. Established values dispersion indicators agility and motor capacity – EG – end

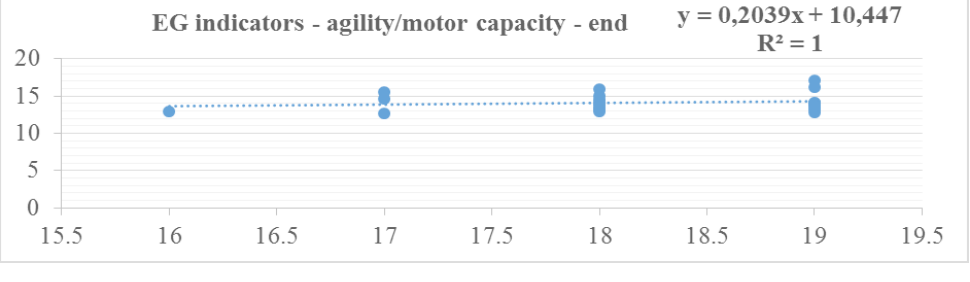


Diagram 5 establishes presence of a high tendency of interdependence between traced indicators of presence of Wellness culture in primary school stage. The above

charts clearly demonstrate trend for relationship between two variables. We allow ourselves to give a verbal assessment of motor potential according to established correlation coefficients, thus proving level of development and presence of Wellness culture at initial stage of educational degree.

Based on a correlation analysis, we established relationship between two variables – motor quality agility and level of motor capacity. Analyzing results of our standardized test battery by which motor potential was measured and assessed, consisting of following motor tests:

– Run 30m – indicates speed that contributes to sprinting. It is directly influenced and partly limited by speed of reaction.

– Long jump from a standing position with two legs – an indicator of explosive power of lower limbs.

– Throwing a solid ball – an indicator of explosive power of upper limbs.

– Run 200 m (shuttle run) – indicates motor quality endurance.

– T-test – basic for evaluating motor potential in development of a motor indicator – agility.

In experiment, we prove that these tests are reliable and give a real assessment of motor condition of studied contingent.

To test research hypothesis, differences between means were compared. According to this method, null hypothesis is accepted or rejected depending on difference obtained.

H0: if $x\bar{0}=x$; H1: if $x\bar{0}\neq x$;

A criterion for accepting or rejecting null hypothesis is whether probability associated with relevant sample statistic is greater or less than a predetermined threshold value. This threshold value is called significance level and is denoted by α. We use a significance level α=0.05. If, at hypothesized value of parameter, probability of occurrence of statistic obtained from sample is less than accepted level of significance, then null hypothesis is rejected as inconsistent with observed situation. However, if this probability is greater than threshold value, null hypothesis is not rejected, it is assumed to be plausible.

The coefficient of variation for test results for indicator – level of motor capacity at end of study in EG after applying author's methodology was 0.76%, indicating a normal distribution (tab.1).

The sample has a small volume $n \leq 30$. The degrees of freedom ν – they are defined as = n-1; n is number of data. Degree of freedom 22 – 1 = 21 Critical value of test statistic.

Determination of Student's t-test for distribution.

$$tem = \frac{\bar{x} - \overline{x_o}}{\frac{\sigma_o}{\sqrt{n}}} = 11.11, \text{ where:}$$

$\bar{x}$ – arithmetic mean value of the data obtained at the control stage;

$\bar{x0}$ – arithmetic mean value of the data obtained at the ascertaining stage;

$\sigma 0$ – standard deviation;

n – number of children.

The sampling distribution of means for increasing level of motor capacity at end of conducted experiment in EG is normal with a mean value of 18.23.

H_0:μ = 18.23; H_1: μ ≠ 18.23

H_0 – We assume that improvement in level of motor capacity of studies is due to chance factors.

H_1 – We assume that improved level of motor capacity of research is a long-term developed and tested proprietary complex of motor exercises.

The critical region of hypothesis (rejection region of H_0) is odd because of two-way inequality defined in H_1. This table value will be determined at selected risk of error 5%, two-sided critical region, and degrees of freedom.

Φ=n-1=22, statistical significance level α=0.05 or quantile of order 0.95 (certainty level of the result). From a table for quantiles of T-distribution it is 1.7207 for t-distribution – tt [α=0.05, two-sided, Φ=n-1=21] = 1.7207.

Since tT=1.7207<tem=11.11, alternative hypothesis is valid: Between studied characteristics at beginning and end of study, a statistically significant difference (dependency) is observed and it is due to applied author's complex in tracked experimental period.

Conclusion: The trial of innovative methodology resulted in an "Excellent" rating for motor capacity level in studied contingent.

The coefficient of variation for test results for indicator – motor quality agility in EG after applying author's methodology was 1.38%, which shows a normal distribution (table 1).

$$tem = \frac{\bar{x} - \overline{x_0}}{\frac{\sigma_0}{\sqrt{n}}} = 0.5, \text{ where:}$$

The sample distribution of developmental average motor quality agility at end of study period in EG is normal with a mean value of 14.16.

H_0:μ = 14.16; H_1: μ ≠ 14.16

Since tT=1.7207>tem=0.5, alternative hypothesis is valid: Between studied characteristics from beginning and end of study, a statistically significant difference (dependency) is observed and it is due to applied author's complex of motor exercises in tracked experimental period.

Conclusion: The testing of innovative methodology led to development of motor quality agility of studied group.

Discussion

The entire study was achieved and research hypothesis stated mathematically and statistically. The existence of Wellness in primary educational level has been

established based on applied innovative technology for development of motor quality agility and increased motor capacity of students in initial stage of basic educational level through applied innovative methodology in PES training, contained by author's complex of motor exercises.

Examining practical effectiveness, study found:

– "Excellent" evaluation of motor capacity level after applied author's complex, compared to established "Good" evaluation for same indicator at beginning of research period.

– "Very good" assessment of level of motor capacity at CG compared to established "Good" assessment for same indicator at same target group at beginning of experimental work.

– Significant development of motor quality agility in EG after applying author's complex, compared to insignificant development for same motor indicator in CG at end of study.

Conclusion

According to tracked motor indicators, following results were established:

– Excellent efficiency of proven innovative methodology.

– Both target groups reported a "Good" score for motor indicator – level of motor capacity in initial study.

– EG students show an "Excellent" rating for motor capacity level after approbation compared to CG who show a "Very Good" rating at end of experimental period.

– Improvement in motor indicator – level of motor capacity is significant in EG students compared to insignificant improvement in CG at end of study period.

– The increase in results for motor capacity level of EG is higher than increase in results for same indicator in CG.

– There is a concentration of high borderline achievements to improve motor indicator – level of motor capacity at EG after implementation of innovative complex.

– There is a ratio of CG with an "Excellent" rating for level of motor capacity at beginning of study, compared to EG with an "Excellent" rating for level of motor capacity after implementation – 1:4.

– EG reports significantly better results in development of motor quality agility after implementation of new methodology compared to lack of development for same motor indicator in CG.

– No improvement in motor quality agility was reported in CG. A concentration of high borderline achievements was registered for same motor indicator at EG after testing author's methodology.

– There is a ratio of studied contingent with a high degree of development of motor quality agility at beginning of study compared to same indicator after implemented author's complex – 1:3.

– Homogeneity of group for studied contingent was established when testing for an indicator – motor capacity of EG at beginning, in contrast to an inhomogeneous group when testing for same indicator at CG in both stages of study.

– Homogeneity of group was established for studied contingent from EG when testing for motor quality agility at beginning of study.

– The available high correlation between established improvement in motor capacity and registered excellent results for motor quality agility in EG, after implemented author's methodology, related to Blaze-Pod Trainer System.

– The application of innovative methodology led to an "Excellent" assessment level of motor capacity, as well as to development of motor quality agility in studied contingent.

NOTES

1. Wellness culture represents knowledge, intellectual and practical skills, creating relationships in the process of education and developing the personality to achieve a healthy lifestyle in a long-term aspect.
2. Physical Education and Sports – a discipline in the Bulgarian education system .
3. https://blazepod.eu/?gclid=EAIaIQobChMI1Mj0xN7N-QIVlo5oCR2ijwaaEAAYASAAEgL0UPD_BwE.

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