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Research Results
Резултати от научни изследвания

IMPLEMENTATION OF MOTOR COMPLEXES BASED ON SPECIALISED APPLICATION SYSTEM BLAZE-POD TRAINER

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Abstract. The current material focuses on the creation of a new technology for the development of motor quality, agility and improvement of general motor condition through an author's set of motor exercises based on the specialized Blaze-Pod Trainer application and verification of its practical effectiveness. The following are monitored: the scientific state of teaching methodology in physical education and sports at the initial stage of the educational degree. According to the nature and essence of the goals, the experimental research is constative-diagnostic and innovative in its part of testing the innovative methodology in practice. A statistical verification of the effectiveness of a tested technology is presented with the following organization of the experimental activity: ascertaining, forming and control stage. Scientifically based conclusions and generalizations are made.

The purpose of the research is to create an innovative technology for the development and improvement of general motor condition, based on the specialized Blaze-Pod Trainer application, by implementing and proving its practical effectiveness through testing in PES[1] training, consisting of an author's complex of motor exercises .

The subject of research is the achievements in the development of motor quality, agility and improvement of general motor condition. The object of research is the learning process related to the development of motor quality, agility, improvement of the general motor condition of third grade students.

The research contingent is forty four third-graders, aged 9-10 years, distributed as follows: twenty-two students in the experimental group (EG) and twenty-two students in the control group (CG). In order to derive a relationship between the tracked motor indicators, a dynamics analysis was applied through mathematical-statistical processing to establish correlation dependencies and determine variation coefficients. The application of the innovative technology took place within the academic year 2022/23 in a metropolitan school.

Keywords: implementation of motor complexes; specialized Blaze-Pod Trainer application; motor activity; motor quality agility; motor condition

Introduction

The present article brings out the theoretical foundations of the problem, emphasizing the development of motor capabilities and specificity in the development of the motor qualities of students in the initial stage of the basic educational level. A technology for developing motor quality, agility and improving the general motor condition of third-graders through an author's complex of motor exercises with an exposed conceptual, substantive and procedural framework is presented. A verification of the effectiveness of an innovative technology is presented with the following: organization of experimental activity in three cognitive stages of experimental research – abscertaining, formative and control stage. Conclusions and summaries have been drawn from the conducted research (Ignatova, Iliev 2022, 2020).

The development of a motor author complex system based on the specialized Blaze-Pod Trainer application is relevant and important not only for increasing the quality of modern motor training in the conditions of sports education, but also for the future professional and social realization of the students after graduation. The present study presents the results of research into the development of the motor quality, agility and improvement of the general motor condition of third graders through an author's complex of motor exercises (Dimitrova 2020; 2029; 2019a).

Methods

The object of research is the learning process related to the development of motor quality, agility, improvement of the general motor condition of third grade students.

The subject of research is the achievements in the development of motor quality, agility and improvement of general motor condition.

The aim of the research is to create a new technology for the development of motor quality, agility and improvement of general motor condition through an author's complex of motor exercises and verification of its practical effectiveness.

The following research tasks also arise from the formulated goal:

- Analysis of the theoretical and methodical literature on the problem;
- Analysis of educational practice for the development of motor quality, agility and improvement of general motor condition;
- Development and implementation in practice of the new technology for the development of motor quality, agility and improvement of general motor condition.
- Carrying out a pedagogical experiment;
- Collection and processing of empirical data from the cognitive research stages of the experiment;
- Mathematical-statistical processing of the researched empirical data;
- Proving the effectiveness of the innovative technology;
- Analysis of the results of the tested technology in practice;

• Conclusions and summaries for multiplying the effect of the implemented innovation.

The following *research hypothesis* was formed:

As a result of the application of technology for the development of motor quality, agility and improvement of the level of general motor condition through an author's complex of motor exercises, it will increase the level of development of motor capacity.

In the course of the research, the following *research methods* were used:

• Theoretical analysis;
• Pedagogical experiment;
• Testing;
• Survey;
• Mathematical and statistical methods.

Results and analysis

The research contingent is forty-four third-graders, aged 9-10 years, distributed as follows: twenty-two students in the experimental group (EG) and twenty-two students in the control group (CG). The research has a practical-applied nature and is aimed at developing the students' motor potential. According to the nature and essence of the goals, the experimental research is constative-diagnostic and innovative in its part of testing the innovative methodology in practice.

Pedagogical testing also has its limitations. Through it, results are revealed for various achievements in the tracked contingent, but the reasons for successes and failures remain hidden. The data registered through pedagogical testing are valid only for the tracked research period, in this case the academic year 2022 – 2023.

Table 1. Parametric motor indicators[2]

№	Physical quality	Characteristic	Test	Units	Accuracy	Increment
1	Speed	Movement speed	Running 30 m.	sec.	0,01 sec.	-
2	Maximum strength	Static force	Standing long jump	cm.	1 cm.	+
3	Maximum strength	Explosive power	Standing long jump	cm.	1 cm.	+
4	Power Endurance	Strength endurance – arms and shoulder girdle	Throwing a solid ball	cm.	1 cm.	+
5	Flexibility	Mobility of the spine	Shuttle run 200m	cm.	0,01 sec.	-
6	Agility	Body balance	T-test	cm.	0,01 sec.	-

The evaluation of the results was carried out on a 20-point scale (Based on sistema, 2019). In order to establish the changes in the general motor condition, the studied contingent was subjected to double testing in the two cognitive stages of the study (initial and final) on four motor indicators. For comparative analysis, the best performance of the two measurements is taken.

In the experimental group (EG) in the ascertainment stage, the results show a good assessment of the general motor condition. The results of the EG third graders test battery show that eighteen EG third graders scored Good, representing 81.82% of all twenty-two EG third graders tested in the ascertainment stage. Two third graders (9.09%) received a Very Good grade and two (9.09%) received an Average grade. There are none among the third-graders from EG who received an Excellent grade during the ascertaining stage – table 2; diagram 1).

Table 2. Results EG – ascertaining stage

Total number	Verbal assessment	Number of children	%
22	Average – D	2	9,09
	Good – C	18	81,82
	Very good – B	2	9,09

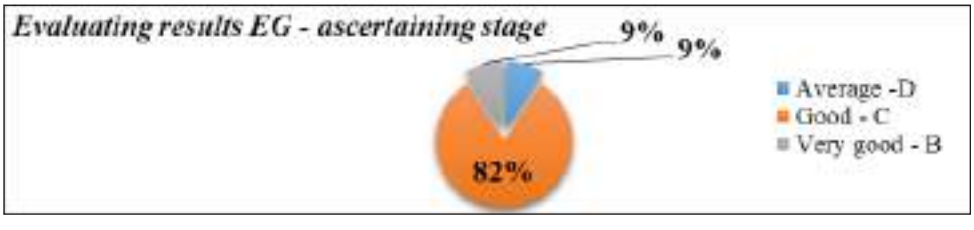

Diagram 1. Evaluating EG results – ascertaining stage

Table 3. Results – EG ascertaining stage

#	GENDER	30m running (sec)	Standing jump (cm)	Throwing a solid ball (cm)	Shuttle run (seconds)	T-test (seconds)	Points	Grades
1.	m	5,34	162	630	42,84	13,14	14	C
2.	m	5,01	153	683	39,06	14,41	9	C
3.	m	5,98	155	410	51,69	13,25	10	C
4.	m	6,41	145	420	51,03	14,19	11	C

5.	**w**	**5,64**	**150**	**460**	**43,91**	**13,84**	**9**	**C**
6.	**w**	**5,87**	**140**	**485**	**49,10**	**14,00**	**14**	**C**
7.	**m**	**5,78**	**157**	**440**	**45,78**	**16,88**	**14**	**C**
8.	**w**	**6,13**	**140**	**370**	**51,15**	**17,53**	**12**	**C**
9.	**w**	**5,94**	**143**	**440**	**43,53**	**15,25**	**11**	**C**
10.	**w**	**6,10**	**141**	**390**	**43,51**	**18,16**	**8**	**C**
11.	**m**	**5,62**	**160**	**630**	**48,78**	**15,77**	**7**	**D**
12.	**m**	**6,82**	**137**	**620**	**58,88**	**21,38**	**9**	**C**
13.	**m**	**5,37**	**160**	**580**	**43,81**	**14,19**	**7**	**D**
14.	**m**	**5,84**	**143**	**460**	**50,60**	**17,37**	**8**	**C**
15.	**m**	**6,22**	**130**	**400**	**48,50**	**13,22**	**10**	**C**
16.	**m**	**7,06**	**138**	**490**	**56,82**	**14,87**	**15**	**B**
17.	**w**	**6,03**	**141**	**470**	**48,37**	**14,44**	**14**	**C**
18.	**w**	**7,09**	**140**	**320**	**54,47**	**15,96**	**15**	**B**
19.	**w**	**6,16**	**142**	**570**	**55,25**	**19,57**	**14**	**C**
20.	**w**	**6,91**	**145**	**430**	**50,03**	**15,53**	**14**	**C**
21.	**w**	**6,72**	**135**	**430**	**53,25**	**13,59**	**11**	**C**
22.	**w**	**8,25**	**130**	**300**	**59,15**	**20,10**	**16**	**C**

Table 4. Results CG – ascertaining stage

#	GENDER	30m running (sec)	Standing jump (cm)	Throwing a solid ball (cm)	Shuttle run (seconds)	T-test (seconds)	Points	Grades
1.	**m**	**5,51**	**140**	**530**	**45,24**	**14,34**	**14**	**C**
2.	**m**	**5,70**	**143**	**400**	**46,75**	**15,66**	**15**	**B**
3.	**w**	**5,49**	**134**	**500**	**49,68**	**15,40**	**11**	**C**
4.	**w**	**5,23**	**137**	**450**	**47,12**	**15,79**	**11**	**C**
5.	**m**	**6,02**	**112**	**420**	**45,12**	**15,16**	**10**	**C**
6.	**w**	**6,03**	**104**	**430**	**61,01**	**16,30**	**13**	**C**
7.	**w**	**6,01**	**125**	**450**	**51,66**	**16,02**	**14**	**C**
8.	**w**	**6,16**	**115**	**460**	**56,85**	**19,52**	**13**	**C**
9.	**w**	**5,46**	**140**	**550**	**49,15**	**16,22**	**12**	**C**
10.	**w**	**5,25**	**126**	**430**	**42,48**	**16,50**	**10**	**C**
11.	**w**	**5,15**	**138**	**600**	**46,36**	**14,67**	**10**	**C**
12.	**m**	**5,78**	**138**	**420**	**52,92**	**14,18**	**10**	**C**
13.	**m**	**5,61**	**110**	**400**	**42,70**	**12,89**	**10**	**C**

14.	m	6,09	110	510	54,77	16,13	11	C
15.	m	5,62	150	370	41,90	13,50	11	C
16.	m	5,38	150	400	39,20	13,34	14	C
17.	w	4,97	160	610	48,18	15,77	13	C
18.	w	5,71	160	500	49,68	14,35	14	C
19.	m	6,20	113	600	57,51	18,69	13	C
20.	m	5,68	125	420	57,51	16,09	13	C
21.	m	5,43	170	620	50,00	16,09	12	C
22.	w	6,40	110	500	60,04	17,10	14	C

The empirical expression in the values of the results in the tracked motor indicators is reflected in the study of the third graders from the control group through the ascertaining stage of table 4. The results of the test assessment of the third graders from the same target group at the ascertaining stage show a Good assessment of the general motor condition of the children. The results of the test battery of third graders from the control group show that twenty-one third graders from the same target group received a Good grade, which represents 95.45% of all tested twenty-two third graders from the control target group during the ascertainment stage (compared to the experimental group – 81.82%). Only one of the third graders from the control group (4.55%) received a Very Good grade (compared to the experimental group – 9.09%). There are no third-graders from the control group who received an Excellent grade (for comparison with the experimental group – also) or an Average grade (for comparison with the experimental group – 9.09%) during the ascertainment stage (see table 5; diagram 2).

Table 5. Results – CG through ascertainment stage

Total number	Verbal assessment	Number of children	%
	Good – C	21	95,45
	Very good – B	1	4,55

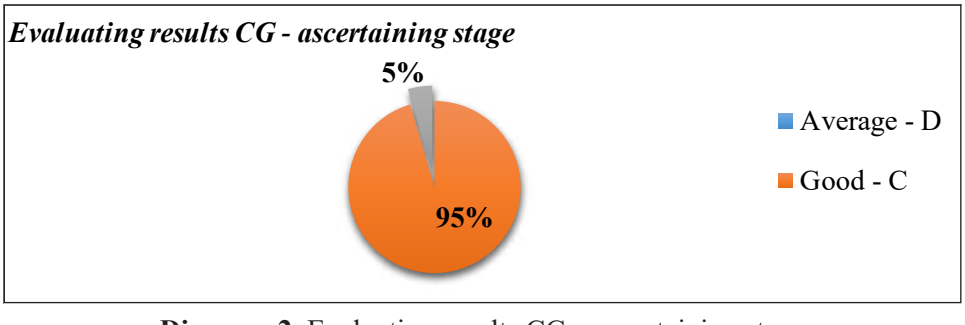

Diagram 2. Evaluating results CG – ascertaining stage

During the testing during the ascertaining stage, the third graders from the experimental group registered a less developed general motor condition with an average score of 11.45 points, compared to the general motor condition of the third graders from the control group with an average result of 12.18 points, during the ascertaining stage – the data are reflected in diagram 3. The results for motor quality agility (diagram 3) were almost identical for the third graders from the experimental group (average – 15.76 seconds) and the third graders from the control group (average – 15.62 seconds).

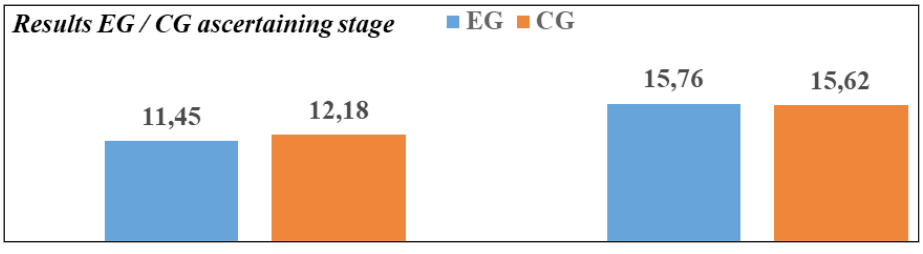

Diagram 3. EG / CG - general motor condition and agility - ascertaining stage

The registered results after applying the author's technology are reflected in table 6.

Table 6. Results - EG through control stage

#	GENDER	30m running (sec)	Standing jump (cm)	Throwing a solid ball (cm)	Shuttle run (seconds)	T-test (seconds)	Points	Grades
1.	m	4,87	177	780	41,69	12,97	16	B
2.	m	4,94	172	800	36,31	13,21	19	A
3.	m	5,53	171	612	45,78	13,4	18	A
4.	m	5,99	168	600	44,41	13,48	19	A
5.	w	5,31	170	600	40,12	12,85	19	A
6.	w	5,79	159	610	45,18	13,92	19	A
7.	m	5,13	171	613	40,12	14,13	19	A
8.	w	5,85	162	518	45,84	14,57	17	B
9.	w	5,18	166	570	41,16	14,55	18	A
10.	w	5,60	162	600	43,7	15,97	18	A
11.	m	5,02	173	770	43,3	15,52	17	B

12.	m	6,00	150	710	49,81	16,19	19	A
13.	m	4,92	172	71,7	43,22	12,69	17	B
14.	m	4,78	167	692	44,12	14,12	18	A
15.	m	5,40	157	520	43,25	12,97	18	A
16.	m	6,03	150	570	49,17	13,91	19	A
17.	w	5,12	165	570	44,18	13,88	18	A
18.	w	6,02	162	495	45,59	13,90	19	A
19.	w	5,02	166	730	46,2	14,98	18	A
20.	w	5,12	169	590	47,3	14,05	19	A
21.	w	5,31	155	630	48,12	13,20	18	A
22.	w	8,25	152	490	50,02	17,13	19	A

The results of the test assessment of the third graders from the experimental group during the control stage show a good assessment of the general motor condition of the children (table 6). The results of the test battery of the third graders from the same target group after an approved author's complex of motor exercises show that there are no students who received a Good grade compared to eighteen third graders (81.82%) who received a Good grade from the experimental group during the control stage (table 7). Four students or (18.18%) compared to two third graders (9.09%) in the ascertainment stage received a Very Good grade, a double increase was recorded. There were no third graders from the experimental group during the control stage who received an Average grade compared to one (4.55%) during the ascertainment stage. While in the testing during the ascertainment stage, there are no third graders from the experimental group who received an Excellent grade (see table 8), in the testing after an approved author's complex of motor exercises, eighteen students received an Excellent grade, which represents 81.82% of the twenty two students from the experimental group tested during the ascertainment stage – according to data from table 7.

Table 7. Results EG - control stage

Total number	Verbal assessment	Number of children	%
22	Very good - B	4	18,18
	Excellent - A	18	81,82

Compared to the results of the ascertaining stage after testing the author's complex of motor exercises, the third graders from the experimental target group increased their average rating for general motor condition from Good to Excellent – as shown in diagram 4.

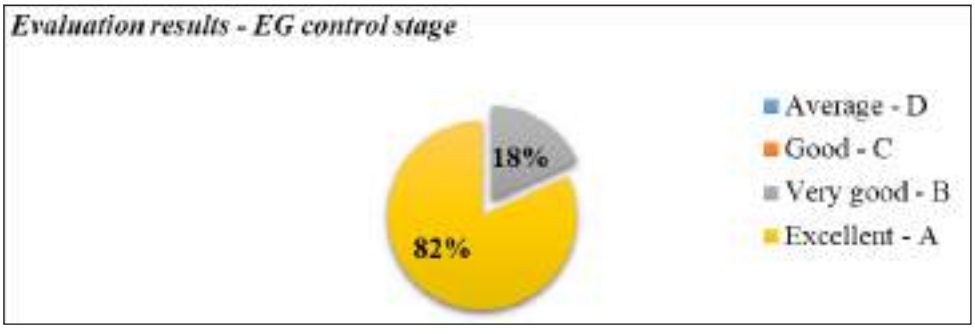

Diagram 4. Evaluation results – EG control stage

The registered results during the control stage of the control group are shown in table 8.

Table 8. Results - CG control stage

#	GENDER	30m running (sec)	Standing jump (cm)	Throwing a solid ball (cm)	Shuttle run (seconds)	T-test (seconds)	Points	Grades
1.	m	5,50	150	590	43,22	14,34	17	B
2.	m	5,69	156	400	44,33	15,66	19	A
3.	m	5,59	140	570	46,69	14,66	16	B
4.	m	5,19	152	550	45,1	14,16	15	B
5.	w	5,12	130	480	44,13	15,10	15	B
6.	w	5,85	110	440	47,9	16,18	17	B
7.	m	5,91	138	460	48,69	15,06	18	A
8.	w	5,81	137	400	46,04	15,59	17	B
9.	w	5,15	147	400	46,93	14,27	17	B
10.	w	5,56	130	432	40,92	15,15	15	B
11.	m	5,37	150	620	42,09	15	16	B
12.	m	5,77	150	460	49,01	19	16	B
13.	m	5,31	140	430	39	14,47	15	B
14.	m	6,03	139	550	46,21	15,96	16	B
15.	m	5,09	190	420	38,29	15,71	16	B
16.	m	5,06	187	550	40,88	13,12	18	B
17.	w	5,38	180	720	47,15	16,59	17	B

18.	w	5,87	170	520	47,35	16,21	18	A
19.	w	5,87	120	670	51,81	19,00	17	B
20.	w	5,69	140	480	56	15,54	17	B
21.	w	5,5	182	660	48,24	14,8	16	B
22.	w	6,06	115	560	52,67	18,00	18	A

The results of the test evaluation of the control group during the control stage show a Very Good evaluation of the general motor condition compared to the Good evaluation during the ascertaining stage (table 8 and diagram 5) and compared to the Excellent evaluation of the results of the experimental group during the control stage (table 6). The results of the test battery of the third graders from the control group during the control stage show that eighteen third graders received a Very Good rating, which represents 81.82% of all tested twenty-two third graders from the same target group during the control stage (for comparison, 4.55% during the ascertainment stage – table 6 and 18.18% for the experimental group during the control stage – table 7). There are no third graders from the control group who received a Good grade in the control stage compared to 95.45% in the ascertainment stage (Table 5). Only four of the third graders from the control group (18.18%) received an Excellent score for general motor condition during the control stage, according to data from table 8, compared to 81.82% of the experimental group, according to data from table 9.

Table 9. Results CG – control stage

Total number	Verbal assessment	Number of children	%
22	Excellent – A	4	18,18
	Very good – B	18	81,82

We use graphical representation to more accurately represent the nature of recorded changes than established changes in empirical data.

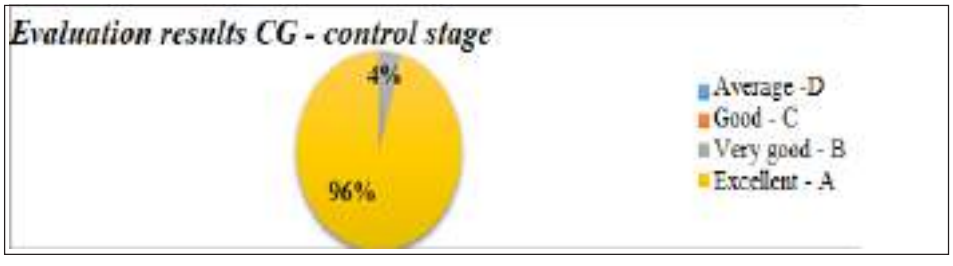

Diagram 5. Evaluation results CG – control stage

During the testing during the control stage, the third-graders from the experimental group showed a more developed general-motor condition with an average score of 18.23 points, compared to the general-motor condition of the third-graders from the control group during the control stage with an average score of 16.64 points – according to data reflected in diagram 6. The results for motor quality agility during the control stage in the experimental group with a mean score of 14.16 sec. were better than the results for motor quality agility during the control stage in the control group with a mean score of 15.61 seconds, according to data reflected in diagram 6.

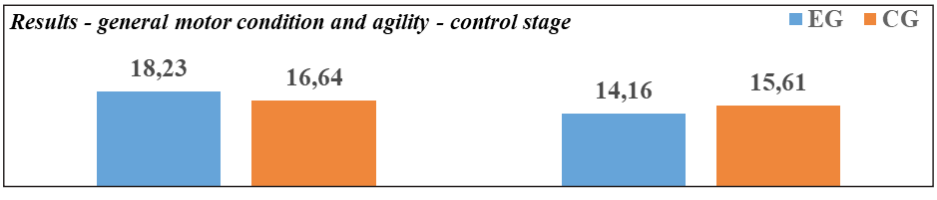

Diagram 6. Results – general motor condition and agility – control stage

The scores of third graders from the experimental group during the control stage for general-motor condition increased by an average of 6.78 points compared to the scores for general-motor condition during the ascertainment stage. Scores from the control group through the control stage for general motor condition increased by an average of 3.84 points. A double-higher increase in the results for general motor condition is reported from an experimental target group after an approved author's complex of motor exercises in the academic year 2022 – 2023. The results of the third graders of the experimental group for motor quality agility improved on average by – 1.57 seconds after the approved author's complex. Third graders in the control group's motor quality agility scores during the control phase worsened by 0.01 seconds compared to the finding phase.

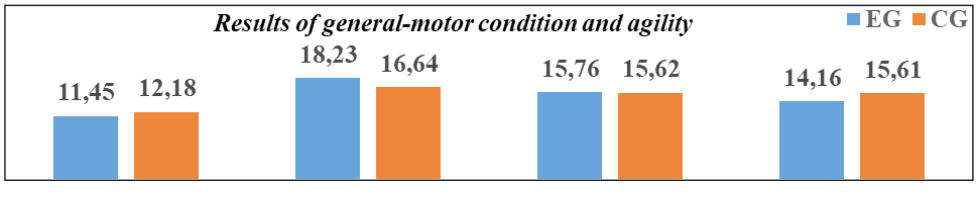

Diagram 7. Results of general-motor condition and agility

Discussion

The applied technology for developing the motor quality of agility and improving the general motor condition of third graders through an author's complex of motor

exercises led to the development of the motor quality of agility in the monitored contingent.

– The present study, mathematically and statistically, confirms that the applied technology for developing the motor quality of agility and improving the general motor condition of the studied contingent has increased the level of motor quality of agility and the level of general motor condition.

– The present study established an excellent assessment of the general motor condition of the third graders after an approved author's complex of motor exercises in the academic year 2022 – 2023, compared to the established Good assessment of the general motor condition during the ascertaining stage.

– The present study established a very good assessment of the general motor condition of the third graders in the control target group compared to the established Good assessment of the general motor condition for the same target group during the ascertainment stage.

– The present study established a significant development of the motor quality of agility of the studied contingent after an approved author's complex of motor exercises, compared to the insignificant development of the motor quality of agility of the third graders from a control target group.

According to the tracked motor indicators, the studied contingent registered the following results within the experimental period:

- The third graders from the experimental group and from the control target group show a Good rating for general motor condition at the ascertainment stage.
- The third graders from the experimental target group show an Excellent rating for general motor condition after the approved author's complex in the control target group, who register a Very Good rating during the control stage.
- Improvement of the general motor condition of the third-grade students through the author's complex of motor exercises is significant in the children of the experimental group compared to the insignificant improvement in the third-grade students of the control target group.
- The increase in the results for the general motor condition of the third graders from the experimental target group is higher than the increase in the results of the control target group.
- There is a concentration of high borderline achievements for improving the motor condition in the studied contingent from an experimental target group after the approval of an author's complex.

A ratio of 1:4 was found for the studied contingent from the control target group with an Excellent rating for general motor condition during the control stage compared to the third graders from an experimental target group with an Excellent rating for general motor condition after an approved author's complex of motor exercises.

The third-graders from the experimental target group registered significantly better results in the development of the motor quality of agility after testing the author's complex compared to the lack of development for the same indicator among the third-graders from the control target group. There was no reported improvement in the motor quality of agility in the third graders from the control group.

On the face is a concentration of high borderline achievements for development in motor quality agility in the research contingent from the experimental target group after testing an author's complex of motor exercises.

There is a ratio of 1:3, of the tracked research contingent, with a high degree of development of the motor quality of agility during the control stage compared to the third graders with a high degree of development of the motor quality of agility after an approved author's complex of motor exercises.

Homogeneity was found in the group of third-graders studied when testing for the general motor condition of an experimental target group during the control stage, in contrast to the inhomogeneous group of the third graders tested when testing for the general motor condition of a control group during the two cognitive stages.

Homogeneity of the group of the studied contingent from the experimental group was established when testing for motor quality agility through a control stage.

There is an absolute positive correlation between the established improvement in the parameters of the general motor condition and the established excellent parametric indicators in the development of motor quality agility after the approval of the author's set of motor exercises related to the Blaze-Pod Trainer system.

The applied technology for the development of motor quality agility and improvement of general motor condition through an author's complex of motor exercises led to an Excellent rating in general motor condition, considering the development of the motor quality agility of the tracked contingent.

Conclusion

In order to achieve the maximum health effect of sports activities, the educational content of the programs should advocate the complex development of motor skills. This is achieved through means and methods outside the direct gaming activity, indirectly affecting it, as well as those that are part of the direct gaming activity. Complex development in the abilities of adolescents, enrichment of knowledge and stimulation of the need for movement are the directions in which to work to improve the effectiveness of training to increase motor culture. In this way, applying innovative methods and approaches to improve motor capacity, in the specific study presented in the present work, namely the approved author's complex of motor exercises related to the Blaze-Pod Trainer system, the pedagogical progress will be personalized and a culture for a healthy lifestyle and sports (wellness) will be guaranteed, objectifying the subject of physical education and sports even more fully in support of the new legislation.

An answer will be provided to the stated requirements for the development of key competences, laid down in the legislative requirement for knowledge and skills for sustainable development and a healthy lifestyle and sport through the means of the subject of physical education and sport, which is expressed in the ninth key competence of the Law on Secondary Education, mandatory for all academic subjects. The assumption was confirmed that after a load in physical education and sports training, indicators of motor quality, agility and general motor condition in third-grade students improved in the 2022 – 2023 school year.

The current experimental study defended the thesis that these are the directions in which work should be done to improve the effectiveness of physical education and sports training in secondary education, as well as enriching knowledge and stimulating the need for movement for a positive impact on the overall development and complex construction of certain personal characteristics in upgrading the motor culture in adolescents.

NOTES

1. Physical Education and Sport - educational discipline in the Bulgarian school.
2. A battery of control tests with indicators.

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