

## Motor skills formation technique in 6 to 7-year-old children based on their psychological and physical features (rock climbing as an example)

ZHANNETA KOZINA<sup>1</sup>, OLENA REPKO<sup>1</sup>, SERGII KOZIN<sup>2</sup>, ANNA KOSTYRKO<sup>2</sup>, TETIANA YERMAKOVA<sup>1</sup>, VOLODYMYR GONCHARENKO<sup>3</sup>

<sup>1</sup>Kharkiv National Pedagogical University, UKRAINE

<sup>2</sup>National Technical University "Kharkiv Polytechnic Institute", UKRAINE

<sup>3</sup>Sumy State A.S. Makarenko Pedagogical University, UKRAINE

Published online: September 26, 2016

(Accepted for publication August 25 2016)

DOI:10.7752/jpes.2016.03137

### Abstract:

Relevance of the work associated with the need to develop special methods of teaching motor actions in climbing primary school children. The purpose of research - theoretical and experimental methodology to justify the construction of training process of young climbers 6-7 years at the initial stage of preparation. The study involved 42 children 6-7 years of age who are engaged in sports climbing club "Ant"; and the experimental and the control group consisted of twenty-one competitor, out of which 12 boys and 9 girls. The experiment lasted for seven months. Based on the analysis of the literature and the results of their own research methodology integral intellectual and spiritual development of young climbers 6-7 years it has been developed. Results. Formulated main provisions teaching motor activities of children 6-7 years: 1 - relying on creative thinking. 2 - broad application of basic movements; 3 - taking into account the ergonomic characteristics of the child; 4 - a holistic method of teaching. For climbing, this means that the child is better to give the job to climb up to a certain point. In the explanation is not necessary to dwell on the details of individual movements. Conclusions. The developed methods of teaching primary school children climbing proved to be effective for the development of motor skills and physical qualities for the development of psycho-physiological features of children.

**Keywords:** technique, children, climbing, training, skill, psychophysiological, opportunities, physical quality.

### Introduction

Pre-school and primary school age are considered most favorable for training difficult coordination motor actions [Pachomov et al., 2014; Kozina, 2015; Lahno, Hanjukova, & Cherniavska, 2015; Podrigalo, Iermakov, Galashko, Galashko, & Dzhym, 2015; Ilnytska et al., 2016; Kozina, Iermakov, Kuzmin, Kudryavtsev, & Galimov, 2016]. It is no accident, in the section of sports such as gymnastics, dance, figure skating, children are recruited at the age of 4-5 years before. Moreover, currently in other sports as well as a trend towards increasingly early set of children.

At an early age the child's body is developing rapidly, in a short time acquires a wealth of information, including - and motor [Kozina, 2015; Podrigalo et al., 2015; Ilnytska et al., 2016]. Under development implies a qualitative change in multicellular organisms, which occur due to the differentiated processes (increasing diversity of cell structures) and lead to qualitative and quantitative changes in the body's functions [Yushina, Nekipelova, Sirotna, Sobyenin, & Zhernakova, 2014; Sobko, 2015].

The relationship is shown the growth and development, in particular that of certain steps may advance only when a certain body size. According to recent data in the literature [Aziz, Chia, Singh, & Wahid, 2011; Al-Ravashdeh, Kozina, Bazilyuk, & Ilnickaya, 2015; Zaporozhanov, Borachinski, & Nosko, 2015], there is a connection of physiological functions to the size and shape of the body [Zhanneta et al., 2015; Bliznevsky, Kudryavtsev, Iermakov, & Jagiello, 2016]. As established by modern experimental and theoretical research on the relationship of structure and function of various organs and systems [Kozina et al., 2015], physical development, describing the geometrical dimensions of the body and its proportions, directly affect the functioning of any and all organs and body systems [Korobeynikov, 2002; Korobeynikov, Korobeynikova, 2003]. This is due to the fact that the weight and body surface area largely determine the rate of metabolism in the body [Kozina, & Iermakov, 2015; Zhanneta et al., 2015]. From these theoretical statements, it can be concluded that for the body of a small size, which is the body baby, characterized by the following features: 1 - high values of relative performance compared to adults (oxygen consumption, the amount of the main bodies, that is, heart, lung, etc.). Therefore it is quite natural for a child to move a lot more than adults; 2 - high heat transfer rates in combination with a higher basal metabolic rate as compared to adults leads to faster fatigue [Gupta, Balasekaran, Govindaswamy, Hwa, & Shun, 2011; Dolomatov et al., 2014; Dragomiretskaya et al., 2015].

In this regard, there is a need to develop a special methodology of teaching motor actions in climbing primary school children, as in climbing are just beginning to be established theoretical and methodological foundations of the training process.

The purpose of work - both theoretically and experimentally justify the methodology of construction of training process of young climbers 6-7 years at the initial stage of preparation.

### **Materials and methods**

To achieve the objectives used the following research methods: analysis and synthesis of the literature data, teacher testing, pedagogical experiment, the method of recording the heart rate using a heart rate monitor models «Polar», Letunov's test, psychophysiological testing of the program "Psychodiagnosings", methods of mathematical statistics using "EXCEL" computer programs, «SPSS».

Of the psychophysiological research methods apply certain simple reaction to visual stimuli. The tests were conducted on the "Psychodiagnosings" program [Kozina, Barybina, Mishchenko, Zigunov, & Kozin, 2011]. The program allows to determine the physiological features - the speed of simple and complex reaction with various modes of operation, as well as the properties of the nervous system.

In the present study we tested the modes of simple visual-motor response, a complex hand-eye reaction time and complex hand-eye reaction to feedback [Korobeynikov, Mazmanian, Korobeynikova, & Jagiello, 2010; Korobeynikov, Mazmanian, Korobeynikova, & Jagiello, 2011; Kozina, & Iermakov, 2015; Ilnytska et al., 2016]. This mode implies the emergence of the next signal, depending on the reaction rate for the previous signal: reacts faster test, the following signal appears faster. The modes of simple visual-motor response and complex hand-eye reaction is determined by the latent period of the reaction, the standard deviation, the number of errors. In the mode of complex visual-motor response feedback determined the latent period of the reaction, the standard deviation, the number of errors to determine the strength of the nervous system, the minimum time exposure and time of exposure to a minimum to determine the functional mobility of nervous processes [Korobeynikov, & Korobeynikova, 2003; Pachomov et al., 2014; Zaporozhanov, Borachinski, & Nosko, 2015]. The smaller the subject makes mistakes, the greater the strength of the nervous system. The less time to the minimum signal the exposure, the higher the mobility of the nervous system [Korobeynikov, & Kharkovliuk, 2000].

To control the functional state of the applied method of continuous registration of heart rate using the heart rate monitor "Polar" model and software "Polar Precision Performance". The method we used for the study of the level of functional load during the registration in the special HR functional test (Letunov's test) [Kondakov, Voloshina, Balysheva, Kopeikina, & Skrug, 2015].

Pulse was considered for 10-second intervals. The sample is conducted as follows: 1) the pulse count in the initial state; 2) 20 sit-ups in 30 seconds 3) counting pulse on the 1 st, 2 nd, 3 rd minute of rest; 4) 15-second running on the spot at the maximum rate; 5) measuring the pulse on the 1 st, 2 nd, 3 rd and 4 minutes' rest; 6) 3-minute run pace in place of steps 180 to 1 minute; 7) measuring the pulse on the 1 st, 2 nd, 3 rd, 4 th and 5 th minute of rest.

To determine the influence of the developed technique to the level of development of coordination abilities of young climbers 6-7 years following tests were used [Kozina, Rypko, Prusik, Prusik, & Cieřlicka, 2014].

1. 3x9 m shuttle run marked the distance of 9 m. Equipment: Stopwatch. The child starts, reaches the 9-meter line, turns and runs back. Running up to the starting line again turns running up to 9-meter line and the finish. It fixes the time of running this distance.

2. Climbing wall bars at a time. Equipment. Swedish wall height 3m, Time. Carrying out the test. The subject becomes the Swedish wall, hands on the bar in a comfortable position, one leg on the bar, the other on the floor. On the command "Go!" The subject begins to climb up the wall bars to the top. Finish - touch the bar at a height of 3 m result. Secured the ascent on the wall bars.

3. Hanging on the crossbar. Equipment. Crossbar, stopwatch. Carrying out the test. The subject holds a direct grip over the crossbar. According to the "Marsh" command separates from the support legs, hangs on the straight hands. Result. Locked time Davis on the bar.

4. Evaluation of the static equilibrium Yarotsky test. Equipment: Stopwatch. Carrying out the test. From the starting position of the main stand, eyes closed, test participant performs a continuous rotation of the head in one direction at a pace - two movements per second. Result. Determined time to within 0.1 seconds from the beginning until the movements of the head loss of balance.

5. Assessment of static equilibrium Romberg method. Equipment: Not required. Carrying out the test. Participant assumes a standing position, feet on the same line to each other, eyes closed, arms outstretched. This position should remain stable position as long as possible. Result. It fixes the amount of body sharp deviations aside.

6. Test the balance "Flamingo". The test is designed to assess static equilibrium. Running balancing on one leg on the stand the following dimensions: Length 50 cm, height 4 cm, width 3 cm. The subject becomes the stand either foot and trying to balance on it for as long as can other leg bent at the knee and tightened to the

buttock brush the same hand. If balance is lost, you must start the test over. Repeating the test is performed as many times as needed to balance the total duration was 40 seconds. Evaluation - counted the number of times that the monitoring spends to maintain sustainable balancing on a pole for 40 seconds.

6. Expert evaluation of climbing equipment. Equipment: climbing stand. Carrying out the test. The athlete performs a climb up the climbing stand on a given route. Estimated level of technical skill on a 5-point scale. The experts are leading specialists in rock climbing (coaches, referees). Number of experts - 5 members. Fixes the arithmetic mean of the evaluation 5 experts [Iermakov, Arziutov, & Jagiełło, 2016; Kozina, Ol'khovyy, & Temchenko, 2016].

When processing the data obtained in the course of study applied the methods of mathematical statistics. We calculate the standard statistics - arithmetic mean, standard deviation (S), the average error (m). The mean group values are compared using Student's t-test for paired and unpaired samples. Data were processed using the software "Excel" and "SPSS".

The study involved 42 children 6-7 years of age who are engaged in rock climbing. And the experimental and the control group consisted of twenty-first athlete, including 12 boys and 9 girls. The experiment lasted for seven months.

## Results

Based on the analysis of literary sources and the results of their own research methodology integral intellectual and spiritual development of young climbers 6-7 years it has been developed. The developed method provides physical, intellectual and spiritual development. In turn, physical development involves the development of physical qualities (strength, speed, agility, endurance, flexibility) and the development of motor skills [Ryepko, 2013; Kozina, Jagiello, & Jagiello, 2015; Kozina, Repko, Ionova, Boychuk, & Korobeinik, 2016] (Fig. 1). Developed an integrated method of preparation of young climbers based on the following assumptions. Pre-school and primary school age are considered to be the most favorable for training difficult coordination motor actions. It is no accident in the section of sports such as gymnastics, dance, figure skating, children are recruited at the age of 4-5 years earlier. Moreover, currently in other sports as well as a trend towards increasingly early set of children. At an early age the child's body is developing rapidly, in a short time acquires a wealth of information, including - and motor [Poliakov, Burov, & Korobeinikov, 1995; Pomeschchikova et al., 2016]. Moreover, the movement of young children funny and charming. They look with no less pleasure than the movement of professional athletes. These facts contradict the classical ideas about the biomechanics of the movements of the child, according to which the movement of young children are not perfect. In our view, in nature there are no imperfections, and there is a special organization of the activity of the body at every stage of its development. The child in his ability to invent words, feel the rhythm, harmony, beauty and original to express their thoughts often superior to adults. This observation can be attributed to the process of development of the various movements of the child. Coaches working with children of that age, say that many of the techniques that are barely adult masters with the help of a mentor, the baby develops its own, spending a lot less time and effort. But there are still children of this age are often taught by analogy with adult education. In this regard, the actual problem is the development of the basic principles of training pre-school and primary school children.

Consider the example of the provisions of basic movements for a person, that is, those who helped him to survive in the course of evolution [Ryepko, 2013; Kozina et al., 2016]. Among these movements - the innate grasping reflex as well as crawling, climbing, including - for the vertical support. Kids love to climb on different vertical structures and natural objects. As a result of these provisions climbing is growing in popularity. Especially popular this type of physical activity among children enjoyed on any of the features of the sport and psychophysical characteristics of children of primary school age. We expand the psychological and physical characteristics of children of primary school age. First of all, it should be noted the high level of creative thinking. From the biomechanical characteristics of children of preschool and primary school age should be noted smaller absolute dimensions of the body, resulting in higher levels of relative strength. In addition, children of this age are different specific body proportions. There are also facts that children are different parts of the brain are responsible for any holistic impact determines the relationship between the physical, mental, psychological development of the child. This is confirmed by theoretical considerations and experimental studies.

Based on the research of the honored master of sports of rock climbing Repko O.A. [Ryepko, 2013; Kozina et al., 2016] the structure of the physical preparation of young climbers has been developed. It has been developed and adapted program of complex preparation of young climbers 6-7 years. Classes with young climbers were constructed in accordance with the physical and psychological characteristics of children this age, namely: a high level of imaginative thinking; less than absolute body size of specific proportions of the body.

In addition to physical development, our method involves spiritual development. Spiritual development involves the ability to the prevalence of human values the ability to overcome the difficulties, the ability to empathize, to understand the unity of life on Earth [Sniras, & Malinauskas, 2005; Iermakova, 2014] (Fig. 1). Ethical and aesthetic development requires organizational skills and the ability to use environmental awareness -

the ability to increase the wealth of nature, the ability to preserve nature in general is a conservation activity (Fig. 1).

The provisions of teaching motor activities of children of 6-7 years were formulated: 1 - relying on creative thinking; 2 - broad application of basic movements; 3 - taking into account the ergonomic characteristics of the child; 4 - a holistic method of teaching. Climbing it means that the child is better to give the job to climb up to a certain point, not dwelling on the details of individual movements. According to formulate the principles of learning as a warm-up exercises used in the verse "Young Wizards" [Kozina, Prusik, Prusik, & Gorner, 2011] for the integral intellectual, physical and spiritual development of children. This technique is for many children is the first step in the future of sports perfection.

The technique is to perform exercises are not under the account, and under lines of poetry about nature; each line of the poem corresponds to physical exercise. Exercises flow smoothly from one another and are built on the natural movements of the child. An integral part of our methodology was the application of copyright story games for the technical preparation of young climbers. For example, in the story the game "Get a star" on the climbing wall hooks chosen a particular color (this is the route). At the top hooks fixed star (a star of the same color as the hooks). Objective: to climb and touch the star, using the hooks of the same color. The game's plot: "Our spacecraft goes green! The path to the star lies through the green planet on which we will be able to reach the stars. "We used also other casual game-tasks, such as: "Gather the flowers", "Gather the harvest", "Get a piece of candy."

We used also the author animation design technique for learning to work with ropes. As a result of the author's technique in the experimental group were found significant changes in the test parameters that reflect the level of physical fitness (table 1). Expert evaluation of climbing technique also significantly increased in the experimental group ( $p < 0.001$ ), while the changes in the control group is not significant ( $p > 0.05$ ).

There was a significant increase in rates the functional readiness of young climbers of the experimental group on the Letunov's test. In the diagnosis of changes in the functional state under the influence of application of the developed integrated methodologies in the Letunov's test the greatest number of significant changes when recovering after exercise heart rate values obtained after the second load - run for 15 seconds.

The use of the integrated method of construction of training process of young climbers positive effect on the cardiovascular system, which has a positive impact on the recovery process after anaerobic-glycolytic loads [Purzycka et.al, 2011; Paczuski, & Cieślicka, 2013; Levandovskaya, & Prusik, 2014; Mikhailova, Grigus, Prusik, & Prusik, 2014; Voronkov, Nikulin, & Sobyenin, 2014; Kortas, et al., 2015, 2016; Kuzmin et al., 2016]. Anaerobic-glycolytic load - is the heaviest burden in terms of mobilization of body reserves, and thus improving the ability to restore it after such loads demonstrates the positive impact of the integrated methodology developed by the functional state of the young climbers. It is important at the present stage, when there is an inadequate response in children of all ages is the load anaerobic-glycolytic direction.

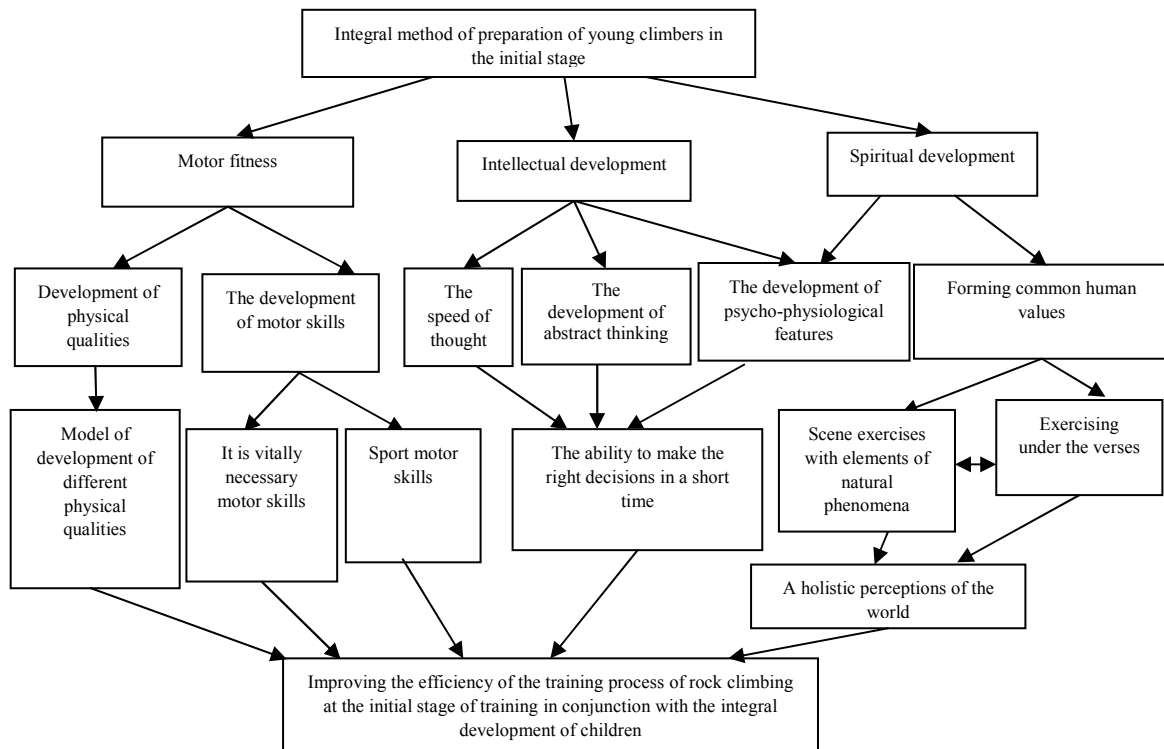


Fig. 1. The structure of the integrated method of preparation of young climbers 6-7 years

Table 1. Indicators of physical readiness of young climbers control (n = 21) and experimental (n = 21) groups before and after the experiment

Indicators	Group	Statistical indicators										The significance of differences in the control and experimental groups before and after the experiment			
		Before the experiment					After the experiment					before the experiment		after the experiment	
		$\bar{x}$	S	m	t	p	$\bar{x}$	S	m	t	p	t	p	t	p
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Shuttle run, 3x9m, s	1	8,33	0,46	0,15	1,22	>0,05	7,52	0,34	0,11	-1,24	>0,05	0,09	>0,05	4,49	<0,001
	2.	7,91	0,97	0,32			7,88	0,83	0,28						
Hanging on the crossbar, s	1	40,5	4,71	0,22	1,58	>0,05	80,2	4,45	0,14	0,01	<0,05	0,73	>0,05	2,90	<0,05
	2.	42,45	4,76	0,25			50,8	5,63	0,21						
Climbing wall bars, min	1	4,56	0,44	0,04	-0,34	>0,05	2,60	4,90	1,55	2,01	<0,05	-0,68	>0,05	3,05	<0,05
	2.	4,43	0,95	0,98			3,67	5,81	1,94						
Yarotsky test, s	1	24,83	5,73	1,81	-0,53	>0,05	33,55	2,53	0,80	5,54	<0,001	-0,23	>0,05	4,41	<0,001
	2.	25,97	3,04	1,01			26,30	3,17	1,06						
Romberg's test, reliability ratings	1	0,80	0,42	0,13	0,63	>0,05	1,00	0,00	0,00	2,68	<0,05	0,46	>0,05	1,50	>0,05
	2.	0,57	0,40	0,17			0,56	0,33	0,18						
"Flamingo", errors	1	7,70	1,90	1,79	0,18	>0,05	3,59	1,37	0,25	3,57	<0,001	0,11	>0,05	3,31	<0,001
	2.	7,44	1,33	1,80			6,30	1,46	0,27						
Expert evaluation techniques, reliability ratings	1	3,2	1,21	0,4	0,12	>0,05	4,9	1,23	0,3	3,68	<0,001	0,76	>0,05	3,42	<0,001
	2.	3,3	1,12	0,5			3,8	1,34	0,4						

Notes: 1 - experimental group; 2 - control group

There was also a significant increase in opportunities for young climbers psychophysiological experimental group, which was reflected in a decrease in latency time simple and complex hand-eye reaction. It has also been found in young climbers experimental group increase strength and mobility of the nervous processes. In the control groups the changes of physical fitness, functional and psychophysiological features are less pronounced or not significant (Fig. 2).

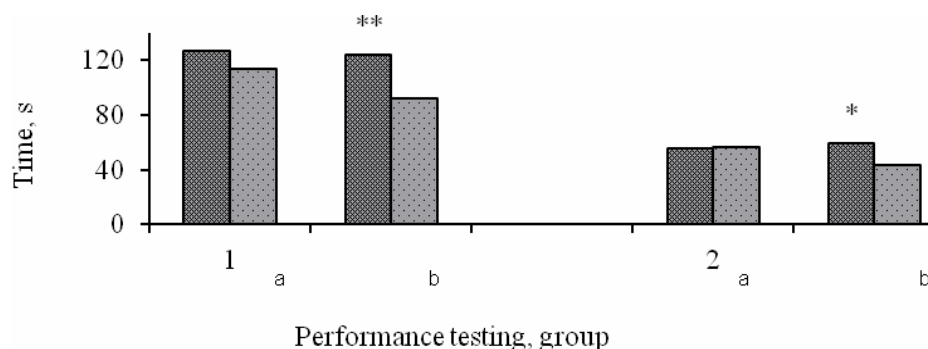


Fig. 2. Performance features of psychophysiological young climbers control (n = 21) and experimental (n = 21) groups before and after the experiment:

- 1 - the total run time of the test;
- 2 - time to a minimum exposure signal;
- a - a control group; b - the experimental group;
- \* - The differences are significant at  $p < 0.05$ ;
- \*\* - The differences are significant at  $p < 0.001$ ;
- before the experiment;
- after the experiment

## Discussion

It should be noted, that the increase in capacity for statistical equilibrium as a result of the integral method of construction of training process of young climbers is not accidental, because all the exercises, which were used in the experimental group according to the developed method, contain elements of statistical equilibrium.

In addition, the technique has many hovering, exercises associated with static and dynamic forces, which caused positive influence biomechanical laws and properties of the muscle groups.

In our study we obtained evidence of the positive impact of the use of the integrated method of construction of training process of young climbers on the rate of visual-motor reactions. This is evidenced by a significant decrease in the time of simple visual-motor response. In addition, the experimental group showed an increase in reaction rate feedback mode.

As a result of the integral method of construction of training process of young climbers also observed improvement in characterizing the mobility and strength of the nervous processes. We know that the mobility and power of neural processes related to hereditary characteristics [Wang, Lim, Aplin, Chia, McNeill, & Tan, 2008; Milczarek et al., 2009; Malinauskas, Dumciene, Mamkus, & Venckunas, 2014; Sobko, 2015; Sobko, Ulaeva, & Yakovenko, 2016]. However, as evidenced by a number of studies, under the influence of specific training of these qualities can be varied within a limited range for each person.

Similar results were obtained in the results of the total time of the test on the choice of the reaction, the minimum signal time exposure and time to minimal exposure signal in the feedback mode. These indicators show the level of mobility of nervous processes, and improvement indicates an increase in the mobility of the nervous processes, which is caused by the use of game forms of training, because the game contribute to the mobility of the nervous processes. In our study we used exercise story, which influence on the properties of the nervous system has not yet been studied, but our research has shown their positive impact on the mobility of the nervous processes. Furthermore, as a result of the integrated method of constructing the training process of young climbers observed increase in strength of the nervous system. This is evidenced by decrease in the number of errors during the test of choice for the reaction rate in the feedback mode. The strength of the nervous system is also a hereditary quality, and it may change in limited quantities under the influence of appropriate factors.

## Conclusions

1. Formed the main provisions of teaching motor actions of young climbers 6-7 years: 1 - relying on creative thinking; 2 - broad application of basic movements: running, jumping, throwing, drum movement, lasagna; 3 - taking into account the ergonomic characteristics of the child; 4 - a holistic method of teaching.

2. A method of constructing an integrated training process of young climbers 6-7 years, which includes a model of incremental change in funds aimed at the development of the various components of physical fitness; special exercises plot character for learning the elements of rock climbing; extensive use of exercises for the integral motor, intellectual and spiritual development of young sportsmen 6-7 years.

3. Experimentally proved the effectiveness of the author's technique of construction of an integrated training process of young climbers at the stage of initial training. As a result of the author's technique in the experimental group were found significant changes in the test parameters that reflect the level of physical readiness, psychophysiological features and functional readiness of young climbers.

## References

- Al-Ravashdeh, Abdel Baset, Kozina, Z.L., Bazilyuk, T.A., Ilnickaya, A.S. (2015). Methodic of senior pupils' training to throwing movements on the bases of technology of complex impact on motor and intellectual development. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 11, 3–10. doi:10.15561/18189172.2015.1101
- Aziz, A. R., Chia, M., Singh, R., & Wahid, M. F. (2011). Effects of Ramadan fasting on perceived exercise intensity during high-intensity interval training in elite youth soccer players. *International Journal of Sports Science and Coaching*, 6(1), 87–98. doi:10.1260/1747-9541.6.1.87
- Bliznevsky, A.A., Kudryavtsev, M.D., Iermakov, S.S., Jagiello, W. (2016). Formation of active-effective attitude of 12-13 years' judo athletes to sports functioning in competition period. *Arch Budo*, 12, 101–115.
- Dolomatov, S. I., Kubyshkin, A. V., Zukow, W. A., Kutia, S. A., Cieslicka, M., Muszkieta, R., & Napierala, M. (2014). Prospects for the replenishment of a feed protein deficit in aquaculture. *Russian Journal of Marine Biology*, 40(4), 233–240. doi:10.1134/S106307401404004X
- Dragomiretskaya, N., Izha, A., Kalinichenko, N., Szark-Eckardt, M., Klimczyk, M., Cieślicka, M., . . . Zukow, W. (2015). Use of antiviral therapy in patients with chronic hepatitis C. *Open Medicine*, 10(1), 209–215. doi:10.1515/med-2015-0032
- Gorelov, A. A., Obvintsev, A. A., & Kondakov, V. L. (2014). Design and functioning of health and fitness technologies in educational environment of military educational institution. *Teoriya i Praktika Fizicheskoy Kultury*, (9), 10–13.

- Gupta, N., Balasekaran, G., Victor Govindaswamy, V., Hwa, C. Y., & Shun, L. M. (2011). Comparison of body composition with bioelectric impedance (BIA) and dual energy X-ray absorptiometry (DEXA) among singapore chinese. *Journal of Science and Medicine in Sport*, 14(1), 33–35. doi:10.1016/j.jsams.2010.04.005
- Iermakov, S. S., Arziutov, G. N., & Jagiełło, W. (2016). Quick training of students to judo techniques. *Archives of Budo*, 12, 15–24.
- Iermakova, T.S. (2014). Forming a health culture of future teachers in Polish educational establishments. *Physical Education of Students*, 5, 14–19. doi:10.15561/20755279.2014.0503
- Ilnytska, G., Kozina, Z., Kabatska, O., Kostiukevych, V., Goncharenko, V., Bazilyuk, T., & Al-Rawashdeh, A. -. (2016). Impact of the combined use of health-improving fitness methods (“Pilates” and “Bodyflex”) on the level of functional and psychophysiological capabilities of students. *Journal of Physical Education and Sport*, 16(1), 234–240. doi:10.7752/jpes.2016.01037
- Jagiello, W., Wolska, B., Sawczyn, S., & Dornowski, M. (2014). The similarity of training experience and morphofunctional traits as prediction criteria of the sports level in subsequent stages of long-term women’s judo training. *Archives of Budo*, 10, 201–210.
- Kondakov, V. L., Voloshina, L. N., Balysheva, N. V., Kopeikina, E. N., & Skrug, D. A. (2015). Correction of the state of cardiovascular system of undergraduates by means of dosed constitutional walking and jogging. *Research Journal of Medical Sciences*, 9(3), 95–98. doi:10.3923/rjmsci.2015.95.98
- Kondakov, V. L., Voloshina, L. N., Balysheva, N. V., Kopeikina, E. N., & Skrug, D. A. (2015). Correction of the state of cardiovascular system of undergraduates by means of dosed constitutional walking and jogging. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*, 6(5), 1567–1571.
- Korobeinikov, H. V., & Kharkovliuk, N. V. (2000). The characteristics of autonomic regulation in persons with different levels of mental work capacity. [Osoblyvosti vehetatyvnoï rehuliatsii u liudei z riznym rivnem rozumovoi pratsezdatsnosti.] *Fiziolohichni Zhurnal (Kiev, Ukraine : 1994)*, 46(1), 82–88.
- Korobeynikov, G. (2002). Human information processing in different age. *Bratislavske Lekarske Listy*, 103(7-8), 244–249.
- Korobeynikov, G., Korobeynikova, L. (2003). Physical development and psychical function states in junior schoolchildren. *Bratislavske Lekarske Listy*, 104(3), 125–129.
- Korobeynikov, G., Mazmanian, K., Korobeynikova, L., & Jagiello, W. (2011). Diagnostics of psychophysiological states and motivation in elite athletes. *Bratislava Medical Journal*, 112(11), 637–643.
- Korobeynikov, G., Mazmanian, K., Korobeynikova, L., Jagiello, W. (2010). Psychophysiological states and motivation in elite judokas. *Archives of Budo*, 6(3), 129–136.
- Kortas, J., Prusik, K., Flis, D., Prusik, K., Ziemann, E., & Leaver, N. (2015). Effect of nordic walking training on iron metabolism in elderly women. *Clinical Interventions in Aging*, 10, 1889–1896. doi:10.2147/CIA.S90413
- Kortas, J., Prusik, K., Flis, D., Prusik, K., Ziemann, E., Leaver, N., & Antosiewicz, J. (2016). Re: Possible effect of decreased insulin resistance on ferritin levels after Nordic walking training. *Clinical Interventions in Aging*, 11, 150–151.
- Kozina, Z., Repko, O., Ionova, O., Boychuk, Y., Korobeinik, V. (2016). Mathematical basis for the integral development of strength, speed and endurance in sports with complex manifestation of physical qualities. *Journal of Physical Education and Sport*, 16(1), 789–792. doi:10.7752/jpes.2016.01012
- Kozina, Z. (2015). Recovery functional condition of sportsmen using individual non-traditional means of rehabilitation. *Journal of Physical Education and Sport*, 15(4), 634–639. doi:10.7752/jpes.2015.04096
- Kozina, Z. L., Iermakov, S. S., Kuzmin, V. A., Kudryavtsev, M. D., & Galimov, G. J. (2016). Change of cortisol and insulin content in blood under influence of special workability recreation system for students with high motor functioning level. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*, 7(2), 1068–1077.
- Kozina, Z.L., Jagiello, Wladyslaw, Jagiello, Marina (2015). Determination of sportsmen’s individual characteristics with the help of mathematical simulation and methods of multi-dimensional analysis. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 12, 41–50. doi:10.15561/18189172.2015.1207
- Kozina, Z.L., Iermakov, S.S. (2015). Analysis of students’ nervous system’s typological properties, in aspect of response to extreme situation, with the help of multi-dimensional analysis. *Physical Education of Students*, 3, 10–19. doi: 10.15561/20755279.2015.0302
- Kozina, Zh. L., Prusik, Krzysztof, Prusik, Katarzyna, Gorner, Karol (2011). Educational, recreation and rehabilitation peculiarities of a system of physical education in integral development of children at the age of 1-5 years. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 3, 84–99.

- Kozina, Zh., Ryepko, O.A., Prusik, Krzysztof, Prusik, Katarzyna, Cieślicka, Mirosława. (2014). Theoretical-methodological study of development of power-speed in climbing. *Physical education of students, 1*, 27–33. doi:10.6084/m9.figshare.903690
- Kozina, Zh.L., Barybina, L.N., Mishchenko, D.I, Zigunov, A.A., Kozin, A.V. (2011). The program “Psychodiagnostics” as a means of determining psychophysiological characteristics and functional status in physical education students. *Physical education of students, 3*, 56–60.
- Kozina, Zh.L., Al-Ravashdeh, Abdel Baset, Kramskoy, S.I., Ilnickaya, A.S. (2015). Methodic of skills’ formation of light athletics motor actions with the help of inter-disciplinary communications and informational technologies, worked out for senior form pupils. *Pedagogics, psychology, medical-biological problems of physical training and sport, 7*, 17-24. doi:10.15561/18189172.2015.0703
- Kozina, Zh.L., Ol’khovyj, O.M., Temchenko, V.A. (2016). Influence of information technologies on technical fitness of students in sport-oriented physical education. *Physical education of students, 1*, 21–28. doi:10.15561/20755279.2016.0103
- Kuzmin, V. A., Kopylov, Y. A., Kudryavtsev, M. D., Tolstopyatov, I. A., Galimov, G. Y., & Ionova, O. M. (2016). Formation of professionally important qualities of students with weakened motor fitness using a health related and sport-oriented training program. *Journal of Physical Education and Sport, 16*(1), 136–145. doi:10.7752/jpes.2016.01023
- Lahno, O., Hanjukova, O., Cherniavska, O. (2015). Evaluation of the effectiveness of integrated psychomotor development of children in the age from 2 to 4. *Journal of Physical Education and Sport, 15*(4), 793–799. doi:10.7752/jpes.2015.04121
- Levandovskaya, L. Y., & Prusik, K. R. (2014). Improvement of functional status of cardiorespiratory system of schoolchildren. *Teoriya i Praktika Fizicheskoy Kultury, (6)*, 35–37.
- Malinauskas, R., Dumciene, A., Mamkus, G., & Venckunas, T. (2014). Personality traits and exercise capacity in male athletes and non-athletes. *Perceptual and Motor Skills, 118*(1), 145–161. doi:10.2466/29.25.PMS.118k13w1
- Mikhailova, N., Grigus, I., Prusik, K., & Prusik, K. (2014). Enhancement of functional state of children with congenital clubfoot via physical rehabilitation. *Teoriya i Praktika Fizicheskoy Kultury, (3)*, 30–32.
- Milczarek, B., Zegarski, T., Sikorski, W., Chłopy, G., Dmitruk, K., Adamczyk, W., . . . Złomańczuk, P. (2009). The influence of adapted physical activity on cognitive performance in elderly people. [Wpływ adaptowanej aktywności fizycznej na poziom zdolności kognitywnych u osób w starszym wieku] *Postepy Rehabilitacji, 23*(4), 11–15.
- Pachomov, S.P., Altuchova, O.B., Demakova, N.A., Krivoshei, I.V., Kolesnikov, Y.V., Sobyenin, F.I. (2014). Study of cytokines polymorphous loci connections with rise of endometrium proliferative diseases. *Research Journal of Pharmaceutical, Biological and Chemical Sciences, 5*(6), 1473–1476.
- Paczuski, R., & Cieślicka, M. (2013). The moderate physic alexercise significantly increases von Willebrand'sfactor'sactivityand concentration intheblood. *Polish Annals of Medicine, 20*(2), 100–105. doi:10.1016/j.poamed.2013.09.008
- Podrigalo, L.V., Iermakov, S.S., Galashko, N.I., Galashko, M.N., Dzhyim, V.Y. (2015). Assessment of arm wrestlers’ adaptation status on the base of saliva biochemical characteristics in dynamic of competition and training loads. *Journal of Physical Education and Sport, 15*(4), 849 – 856. doi:10.7752/jpes.2015.04131
- Podrigalo, L.V., Iermakov, S.S., Nosko, M.O., Galashko, M.N., Galashko, N.I. (2015). Study and analysis of armwrestlers’ forearm muscles’ strength. *Journal of Physical Education and Sport, 15*(3), 531–537. doi:10.7752/jpes.2015.03080
- Poliakov, A. A., Burov, A. I., & Korobeinikov, G. V. (1995). Functional organization of mental activity in people of varying age. [Funktsional'naia organizatsiia umstvennoi deiatel'nosti u liudei raznogo vozrasta.] *Fiziologiya Cheloveka, 21*(2), 37–43.
- Pomeshchikova, I.P., Shevchenko, O.O., Yermakova, T.S., Paievskiy, V.V., Perevoznik, V.I., Koval, M.V., Pashchenko, N.O., Moiseienko, O.K. (2016). Influence of exercises and games with ball on coordination abilities of students with disorders of muscular skeletal apparatus. *Journal of Physical Education and Sport, 16*(1), 146 – 155.
- Purzycka, D., Prusik, K., Bohdan, M., Sroka, T., Włodarczyk, P., Marczulin, J., . . . Zdrojewski, T. (2011). Effect of 3-month nordic walking training on arterial blood pressure in women aged 60 years and over. [Ocena wpływu 3-miesięcznego treningu Nordic Walking na ciśnienie tętnicze u kobiet po 60. roku życia]. *Nadciśnienie Tętnicze, 15*(6), 335–340.
- Ryepko, O.A. (2013). Features and functionality of speed and power capabilities of elite climbers and various types of rock climbing. *Physical education of students, 6*, 60–65. doi:10.6084/m9.figshare.840505.
- Sniras, S., & Malinauskas, R. (2005). Moral skills of schoolchildren. *Social Behavior and Personality, 33*(4), 383–390.



- Sobko, I. (2015). An innovative method of managing the training process of qualified basketball players with hearing impairment. *Journal of Physical Education and Sport*, 15(4), 97, 640–645. doi:10.7752/jpes.2015.04097.
- Sobko, I.N., Ulaeva, L.A., Yakovenko, Y.A. (2016). Factorial structure of physical rehabilitation group students' complex fitness. *Physical Education of Students*, 2, 32–37. doi:10.15561/20755279.2016.0205
- Voronkov, A.V., Nikulin, I.N., Sobyenin, F.I. (2014). On the improvement of the control force readiness students engaged arm sport. *Physical education of students*, 2, 3–7. doi:10.6084/m9.figshare.917169.
- Wang, J., Lim, C., Aplin, N. G., Chia, M., McNeill, M., & Tan, C. (2008). Students' attitudes and perceived purposes of physical education in Singapore: Perspectives from a 2 × 2 achievement goal framework. *European Physical Education Review*, 14(1), 51–70. doi:10.1177/1356336X07085709
- Yushina, I.A., Nekipelova, E.V., Sirotina, S.S., Sobyenin, F.I., Zhernakova, N.I. (2014). Studying the impact of the genetic polymorphisms of chemokines on the arterial pressure level and kidney function in patient with the chronic glomerulonephritis. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*, 5(5), 1103–1107.
- Zaporozhanov, V.A., Borachinski, T., Nosko, Y.N. (2015). Assessment of children's potentials in dynamic of initial stage of sport training. *Journal of Physical Education and Sport*, 15(3), 525–530. doi:10.7752/jpes.2015.03079
- Zhanneta, K., Irina, S., Tatyana, B., Olena, R., Olena, L., & Anna, I. (2015). The applying of the concept of individualization in sport. *Journal of Physical Education and Sport*, 15(2), 172–177. doi:10.7752/jpes.2015.02027