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ОСНОВИ ЮНАЦЬКОГО СПОРТУ

PECULIARITIES OF MOVEMENT PLASTIQUE DEVELOPMENT IN YOUNG GYMNASTS

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Abstract

The purpose of this study was to substantiate and create a technique for the development of movement plastique in gymnastics at the initial training stage and experimentally verify its effectiveness.

Materials and methods. The study participants were 28 boys aged 6-7 engaged in gymnastics (14 – control group and 14 – experimental group). To achieve the purpose set, the study used the following research methods: analysis of scientific and methodological literature, pedagogical testing and methods of mathematical statistics.

Results. The use of a special technique that includes exercises developing expressive movements, exercises of classical and parterre choreography, rhythmic gymnastics and elementary dance exercises at the initial training stage in gymnastics improved the development level of movement plastique and its individual components, in particular the amplitude and dynamism (at $p < 0.05$), the accuracy and the degree of using accompanying movements (at $p < 0.001$). The study revealed strong and average correlations between the individual indicators and movement plastique in general.

Conclusion. The study defined the criteria and modern requirements for gymnasts' movement plastique, as well as its individual indicators: amplitude, accuracy, degree of using accompanying movements, and dynamism. The study created a technique for the development of movement plastique in young gymnasts and experimentally proved its effectiveness.

Keywords: movement plastique, amplitude, accuracy, dynamism, accompanying movements, technique, young gymnasts.

Introduction

The analysis of modern gymnastics competitions shows that judges' scores are significantly influenced by the so-called "movement plastique" of athletes. For the first time, the concept of "plastique" was introduced by Bernshtein (1991). By this concept, he meant one of coordination abilities, in particular the human body movement determined by the pattern and rhythm that reflects the human spiritual and inner world. The well-known American scientist Benjamin Lowe (1984) also draws attention to such movement characteristic in sport as evenness, that is elegance, grace. In his opinion, evenness arises due to the dynamic form

and gives the impression of increased control, balance, a sense of time.

A more detailed study of movement plastique was carried out by Nazarenko (1999). The author points out that such coordination ability as plastique is impossible without a high level of coordination of muscular motor activity and movement rhythmicity, which ensures the alternation of the working muscles — flexors and extensors, as well as pace, dynamics and harmony. The level of plastique development is directly dependent on motor experience, coordination abilities and skillfulness. By movement plastique, researchers Slyadneva (2013) and Stepanova (2001) understood skillfulness, accuracy, amplitude, virtuosity, grace, and integrity of movements. Modern dictionaries define the term "plastique" as an art of rhythmic, harmonious movements of the body.

The analysis of special literature showed that certain issues of plastique and expressiveness of movements in artistic gymnastics were studied by Gorbacheva (2000), Karavatskaya (2002), Karpenko, and Rumba (2001); in sports gymnastics — by Omelianchyk (2001), and others. The authors identified the main components of performance mastery, which included: plastique, expressiveness, acting skills, expression of movements. In order to improve performance mastery, the researchers recommend to focus on technical, choreographic and integrative training of gymnasts, as well as on the peculiarities of developing competitive compositions and selecting musical accompaniment to them.

Arkayev (1994), Smolevskiy, and Haverdovskiy (1999), Khudolii (2011) emphasized the need for the advanced development of gymnasts' coordination abilities, in particular movement plastique, starting from the first stage of long-term training.

In their previous works, Kravchuk (2010) and Kravchuk, Sanzharova, Holenkova, and Lytovko (2010) addressed certain issues of developing movement plastique expressiveness at the stage of specialized basic training in artistic gymnastics and in female students of higher education pedagogical institutions majoring in artistic gymnastics. The authors created their own technique of developing movement plastique expressiveness and introduced it into the training process. The technique consisted of the following components: musical and rhythmic training; mastering the skills of expressive movements; choreographic training; studying the elements of folk and ballroom dance.

Thus, in the context of this article, movement plastique refers to the ability of athletes to harmoniously coordinate movements and poses in sports activities, to perform them with a particular amplitude, pace and rhythm.

In our opinion, a purposeful introduction of a similar technique into the training process of young gymnasts will increase the effectiveness of their movement plastique development.

The purpose of the study was to substantiate and create a technique for the development of movement plastique in gymnastics at the initial training stage and experimentally verify its effectiveness.

Study objectives

To define the criteria and modern requirements for gymnasts' movement plastique.

To create a technique for the development of movement plastique in young gymnasts.

To experimentally verify the effectiveness of the developed technique.

Materials and methods

Study participants. The study participants were 28 young gymnasts (boys), 14 — control group and 14 —

experimental group. All the participants were engaged in gymnastics in initial training groups of the second year of study. At the beginning of the experiment, the young gymnasts were 6-7 years old.

Methods of pedagogical testing. In order to develop an effective technique, the study drew on previous studies and determined the key indicators of movement plastique level of the study participants: amplitude and accuracy, the degree of using accompanying movements of the trunk, head, neck, arms, hands, dynamism (strength, speed and intensity). These indicators were evaluated at the beginning and end of the experiment when the study participants were performing a voluntary competitive combination, which consisted of the following elements: backward roll, backward roll to supine lying, shoulderstand, "bridge", 180-degree sideways roll, lying support, jump squat, forward roll, upward jump in arch position, arms up. The combination was evaluated by four experts on a five-point scale (higher and lower points were discarded, and the arithmetic mean of the remaining ones was calculated) (see Table 1).

Methods of mathematical statistics. The test results obtained during the study were processed using traditional methods of mathematical statistics. For each indicator, the study calculated the arithmetic mean, mean-square deviation (S) (standard deviation), coefficient of variation (V), and estimated the probability of difference between the parameters of the initial and final results by the Student's t-test with the corresponding probability level (p). Also, to find out the relationship between the plastique indicators, the study used a correlation analysis by calculating the Pearson coefficient. The obtained data were statistically processed by the computer programs Microsoft Excel «Data Analysis», SPSS.

In order to develop movement plastique at the initial training stage, the study proposed a technique that combines the following means: exercises developing expressive movements; exercises of classical choreography; rhythmic gymnastics exercises with compulsory musical accompaniment, and elementary dance exercises (see Table 2).

All these exercises were introduced into the training process of young gymnasts who were members of the experimental group during the academic year from September to May 2017-2018, in the following way: the exercises for mastering expressive movements and dance exercises were used during the preparatory and final parts of each training session. The choreographic and rhythmic gymnastics exercises alternated. In the control group, the exercises for mastering expressive movements and choreographic exercises were used fragmentarily, and the rhythmic gymnastics and dance exercises were not used at all. The experimental and control groups included young gymnasts aged 6-7

Table 1. Characteristics and criteria for evaluating movement plastique indicators of the study participants

Movement plastique indicator	Indicator characteristic	Points deduction
Amplitude	High level of flexibility in the joints involved in performing the competitive combination elements	Insufficient extension at the hip joints when performing the shoulderstand (from -0.1; -0.3 or -0.5 depending on the degree of deviation from the ideal exercise performance). Insufficient amplitude at the shoulder, hip joints and the vertebral column when performing the bridge exercise (-0.1; -0.3 or -0.5 depending on the degree of deviation from the ideal exercise performance). No arching when performing the jump in arch position (-0.3)
Accuracy	Accuracy of spatial, temporal and strength characteristics of movement (performance of exercises along a clearly calculated trajectory, amplitude, height, maintenance of ideal posture).	Bent arms or knees (-0.1 or -0.3 depending on the degree of deviation). Straddle legs or knees (-0.1 or -0.3 depending on the degree of deviation). Insufficient accuracy of tucking in the rolls (-0.1 or -0.3 depending on the degree of deviation). Uncertainty when performing the element (-0.1 each time). Falls when performing the element (-1.0) Bad orientation on the platform when performing the combination (-0.1 each time) Excessive hands and feet movements when performing the rolls -0.1 each time).
Usage of accompanying movements	The degree of using accompanying movements of the trunk, head, neck, arms, hands.	Toes are not stretched, relaxed feet (-0.1 each time). Excessive tension of the trunk, neck, arms and hands (-0.1 each time). Clenched hands (-0.1 each time) Head is in one position and does not accompany the trunk movements (-0.1 each time).
Dynamism	Combination of strength, speed and intensity of movements.	Performance of the whole combination as a set of separate elements (-0.3). Large pauses between the combination elements (-0.1 each time). Performance of dynamic elements (rolls) at a slow pace (-0.3 each time). Sluggish, undisciplined performance of the elements without the necessary muscle tension (-0.1 each time).

engaged in initial training groups of the second year of study.

Study results

The comparison of the main movement plastique indicators of the study participants in the control and experimental groups at the beginning and end of the pedagogical experiment showed that they remained almost unchanged in the control group. Whereas the experimental group demonstrated a statistically significant (at $p < 0.05$) increase in amplitude, dynamism and plastique of performing competitive exercises. It should be noted that the greatest increase is observed in the indicators of accuracy and degree of using accompanying movements (at $p < 0.001$) (see Table 3).

When calculating the correlation coefficient, the study found a strong correlation between:

- amplitude and dynamism of movements ($r=0.66$);
- accuracy of movements and the degree of using accompanying exercises ($r=0.77$);
- movement plastique in general and accuracy ($r=0.72$);

- movement plastique in general and the degree of using accompanying exercises ($r=0.70$);
- movement plastique in general and dynamism ($r=0.72$).

Average correlation between:

- amplitude and accuracy of movements ($r=0.55$);
- degree of using accompanying exercises and dynamism ($r=0.53$);
- movement plastique in general and amplitude ($r=0.55$).

Discussion

The results obtained in the study confirm that it is important for aesthetic sports to develop such coordination ability as plastique, which results in a high level of athletes' movement coordination and rhythmicity, as well as their pace, dynamics and harmony (Bershtein, 1991; Low, 1984; Stepanova, 2001). The development and manifestation of movement plastique require an emotional approach, a particular state of mind associated with expressing different feelings, which also need to be developed during the

Table 2. Means for the development of movement plastique at the initial training stage in gymnastics

Means	Exercises	Predicted impact
Exercises developing expressive movements	<p>Walking and running exercises: walking on toes, soft, rolling, high, broad, elastic; various kinds of running, high knees, butt kicks, jogging, straight-leg, backward, sideways running.</p> <p>Springy movements: legs (on both legs, on one leg and alternately); arms (in all directions, one — and contralateral); holistically (with all parts of the body).</p> <p>Relaxation: simple — “dropping” arms, head or trunk; segmental — alternately “dropping” hands, forearms, elbows, shoulders, neck, trunk, bending legs, “fall” on the floor on the back or on the side; escaping — simultaneous, but gradual removal of muscular tension from the whole body or its part.</p> <p>Waves: with arms (the main form — hands aside); with the trunk (sitting on the heels and standing on the knees); holistically (forward, reverse (backward), lateral (sideways) and lateral with a forward turn).</p> <p>Swings: with arms — forward/backward and sideways; with the trunk — from sitting on the heels, sitting on the hips with legs bent and standing — “dropping” the trunk forward in combination with a forward/backward and sideways movement of the arms; holistically — forward, sideways, sideways with a turn.</p>	Develop the “gymnast’s”, school of movements, contribute to the formation of “gymnastic style”; develop flexibility, strength and endurance; teach to control various parts of the body and coordinate their movements; develop the ability to use accompanying movements of the trunk, head, neck, arms and hands.
Choreographic exercises	Classical choreography	cultivate a culture of movement; develop a correct posture; correct clubfoot; improve muscle elasticity and ankle, knee and hip mobility; develop strength and mobility of the lower and upper limbs and of the trunk muscles. develop the ability to use accompanying movements of the trunk, head, neck, arms and hands.
	Parterre choreography	
Rhythmic gymnastics	Arm movements: lifting, lowering, bending, extending, circling, turning, snatching, swinging, throwing, applauding, waving, gripping, crossing. Leg movements: lifting, lowering, bending, extending, circling, swinging, stamping, crossing, stepping, hopping. Head movements: bends, turns, circular and combined movements. Trunk movements: bends, turns, waves, combined movements. (All exercises are performed to rhythmic music).	teaches to control various parts of the body and coordinate their movements; develops flexibility, strength and endurance; develops a sense of rhythm and dance ability; helps to open up, to show creativity through musical movements.
Dance exercises	<p>Elements of folk and ballroom dances: chassé step (cross); triple step (cross, three variants); gallop steps (forward, aside, back); polka steps;</p> <p>Elements of Ukrainian folk dances: kopyrsalochka, prysiadka, virovchka, game dances, in which the dancer does not simply imitate the habits of animals or birds, but also tries to add the traits of human character to them: “Bear”, “Fish”, “Bird”, “Cat”.</p>	teach to control various parts of the body and coordinate their movements; develop the ability to control and feel one’s body; develop coordination and plastique of the body; develop the ability to control one’s gestures, facial expressions and pantomime; reveal the creative potential of athletes.

training process. (Gorbacheva, 2000; Karavatskaya, 2002; Nazarenko, 1999).

The study of fundamental works (Arkayev, 1994; Smolevskiy, & Haverdovskiy, 1999; Khudolii, 2011) in terms of the content, methods and forms of training young gymnasts suggests the need to use the means

aimed at developing movement plastique in gymnasts as early as possible. That is why the technique for the development of this important coordination ability that affects young gymnasts’ athletic performance and quality of training was created for athletes of initial training groups.

Table 3. Level of movement plastique of the study participants in the control and experimental groups before and after the pedagogical experiment

Indicators	CG (n=14)		t	p	EG (n=14)		t	p
	before	after			before	after		
Amplitude of movements	3.54±0.33	4.06±0.26	1.13	p>0.05	3.39±0.28	4.62±0.26	2.93	p<0.05
Accuracy of movements	2.89±0.21	3.25±0.2	1.24	p>0.05	2.75±0.18	4.28±0.2	5.67	p<0.001
Usage of accompanying movements	2.61±0.26	2.93±0.24	0.8	p>0.05	2.75±0.18	4.64±0.26	4.69	p<0.001
Dynamism of movements	2.93±0.27	2.96±0.25	0.083	p>0.05	2.96±0.16	4.39±0.26	2.38	p<0.05
Plastique in general	2.99±0.20	3.3±0.20	1.1	p>0.05	2.96±0.16	4.49±0.19	6.3	p<0.05

The study relied on the data obtained in the previous works (Kravchuk, 2010; Kravchuk, Sanzharova, Holenkova, & Lytovko, 2010) on the determination of the components of movement plastique expressiveness and methods of its development in artistic gymnastics by means of: musical-rhythmic and choreographic training; mastering the skills of expressive movements and studying the elements of folk and ballroom dances. From this perspective, the data obtained in this work confirm and develop the concepts presented in the above papers.

The proposed technique for developing movement plastique in young gymnasts is based on methodological developments of leading specialists in the field of gymnastics (Khudolii, 1998; Khudolii, Ivashchenko, Iermakov, & Rumba, 2016; Maria Kritikou, Olyvia Donti, Gregory C. Bogdanis, Anastasia Donti & Kalliopi Theodorakou, 2017). It also includes elementary exercises of artistic gymnastics and choreography (Karpenko, et al, 2003; Sosina, 2009; Fryz, 2006) and rhythmic gymnastics (Lisitskaya, 1987) and completely proves the effectiveness of these means for the development of movement plastique.

The practical significance of the study is expressed in the high effectiveness of the proposed technique of movement plastique development at the initial training stage in gymnastics. Moreover, the specificity of the exercises used in this technique not only affects the development of movement plastique indicators, but also can contribute to the development of other physical abilities necessary for young gymnasts: flexibility, strength, separate coordination abilities, as well as the culture of movements, dance ability, artistry, etc. In addition, the technique is quite easy to master for both athletes and coaches and does not require expensive equipment.

The strict requirements for the aesthetic component of gymnasts' performances, dictated by the rules of gymnastics competitions, provide direction for further research in seeking techniques for developing and improving movement plastique at the next stages of long-term training.

Conclusions

The study shows that movement plastique development at the initial stage of training in gymnastics

can be facilitated by using a technique that includes exercises for developing expressive movements, exercises of classical and parterre choreography, rhythmic gymnastics and elementary dance exercises.

The study experimentally proved a statistically significant influence of the developed technique on the growth of young gymnasts' movement amplitude, dynamism and plastique (at $p<0.05$), and especially the indicators of accuracy and the degree of using accompanying movements (at $p<0.001$), which was determined when evaluating the performance of the voluntary competitive combination.

The study defined the degree of relationship between the individual indicators and plastique in general, in particular a strong correlation between the amplitude and dynamism of movements, the accuracy of movements and the degree of using accompanying movements, as well as the movement plastique in general and accuracy, the degree of using accompanying movements and dynamism. The study revealed an average correlation between the amplitude and accuracy of movements, the degree of using accompanying movements and dynamism, and movement plastique in general and amplitude.

Conflict of interest

The authors declare no conflict of interest.

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ОСОБЛИВОСТІ РОЗВИТКУ ПЛАСТИКИ РУХІВ ЮНИХ ГІМНАСТІВ

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Реферат. Стаття: 7 с., 3 табл., 21 джерело.

Мета дослідження – обґрунтувати й розробити методику розвитку пластики рухів в спортивній гімнастиці на етапі початкової підготовки та експериментально перевірити її ефективність.

Матеріали і методи. У дослідженні взяли участь 28 хлопчиків 6-7 років, що займалися спортивною гімнастикою (14 – контрольна та 14 – експериментальна група). Для вирішення поставлених завдань було використано наступні методи дослідження: аналіз науково-методичної літератури, педагогічне тестування та методи математичної статистики

Результати дослідження. Використання на початковому етапі підготовки в спортивній гімнастиці спеціальної методики, яка включає вправи для формування виразного руху, вправи класичної й партерної хореографії, ритмічної гімнастики та

елементарні танцювальні вправи, сприяло підвищенню рівня розвитку пластики рухів й окремих її компонентів, зокрема амплітуди й динамізму (при $p < 0,05$) та точності й ступеню використання супроводжуваних рухів (при $p < 0,001$). Виявлено сильні й середні кореляційні зв'язки між окремими показниками та пластикою рухів в цілому.

Висновки. Визначено критерії та сучасні вимоги до пластики рухів гімнастів, а також окремих її показників: амплітуди, точності, ступеня використання супроводжуваних рухів та динамізму. Розроблено методику розвитку пластики рухів юних гімнастів та експериментально доведено її ефективність.

Ключові слова: пластика рухів, амплітуда, точність, динамізм, супроводжувачі рухи, методика, юні гімнасти.

ОСОБЕННОСТИ РАЗВИТИЯ ПЛАСТИКИ ДВИЖЕНИЙ ЮНЫХ ГИМНАСТОВ

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Реферат. Статья: 7 с., 3 табл., 21 источник.

Цель исследования – обосновать и разработать методику развития пластики движений в спортивной гимнастике на этапе начальной подготовки и экспериментально проверить ее эффективность.

Материалы и методы. В исследовании приняли участие 28 мальчиков 6-7 лет, занимающихся спортивной гимнастикой (14 – контрольная и 14 – экспериментальная группа). Для решения поставленных задач были использованы следующие методы исследования: анализ научно-методической литературы, педагогическое тестирование и методы математической статистики

Результаты исследования. Использование на начальном этапе подготовки в спортивной гимнастике специальной методики, которая включает упражнения для формирования выразительного движения, упражнения классической и партерной хореографии, ритмической гимнастики и

элементарные танцевальные упражнения, способствовало повышению уровня развития пластики движений и отдельных ее компонентов, в частности амплитуды и динамизма (при $p < 0,05$) и точности и степени использования сопровождающих движений (при $p < 0,001$). Выявлены сильные и средние корреляционные связи между отдельными показателями и пластикой движений в целом.

Выводы. Определены критерии и современные требования к пластике движений гимнастов, а также отдельным ее показателям: амплитуде, точности, степени использования сопровождающих движений и динамике. Разработана методика развития пластики движений юных гимнастов и экспериментально доказана ее эффективность.

Ключевые слова: пластика движений, амплитуда, точность, динамика, сопровождающие движения, методика, юные гимнасты.

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