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## **METHODOLOGY OF INTEGRATED TRAINING OF HIGHLY QUALIFIED GYMNASTS**

### **Abstract**

This article is devoted to current issues of development and implementation of methods of integrated training of highly qualified athletes in the field of artistic gymnastics. Particular emphasis is placed on the technical component of the integrated approach, which determines the key elements of an athlete's readiness, the level of which directly affects the reliability of performing complex combinations and the artistic perfection of performances within the framework of the next Olympic cycle. The author rightly emphasizes the importance of detailed development and scientifically based choice of this form of training, since ignoring this aspect often hinders the search for optimal solutions to training problems.

**Kalit soʻzlar:** pedagogical process, technological components, correlation analysis, factor analysis, training tools, integrated training, technical training, motor training, functional training.

## **YUQORI MALAKALI GIMNASTIKACHILARNI INTEGRAL TAYYORLASH USLUBIYATI**

### **Annotatsiya**

Ushbu maqola gimnastika sohasida yuqori malakali sportchilarni kompleks tayyorlash usullarini ishlab chiqish va joriy etishning dolzarb masalalariga bagʻishlangan. Sportchining tayyorgarligining asosiy elementlarini belgilaydigan integral yondashuvning texnik tarkibiy qismiga alohida eʼtibor qaratiladi, uning darajasi keyingi Olimpiya sikli doirasidagi murakkab kombinatsiyalarning ishonchligi va ijrosini badiiy mukammalligiga bevosita taʼsir qiladi. Muallif ushbu tayyorgarlik shaklini batafsil ishlab chiqish va ilmiy asoslangan tanlash muhimligini asosli ravishda taʼkidlaydi, chunki bu jihatni eʼtiborsiz qoldirish koʻpincha mashgʻulot vazifalariga maqbul yechimlarni izlashga toʻsqinlik qiladi.

**Key words:** pedagogik jarayon, texnologik komponentlar, korrelyatsion tahlil, omillarni tahlil qilish, tayyorgarlik vositalari, integral tayyorgarlik, texnik tayyorgarlik, harakatli tayyorgarlik, funktsional tayyorgarlik.

## **МЕТОДОЛОГИЯ ИНТЕГРАЛЬНОЙ ПОДГОТОВКИ ВЫСОКОКВАЛИФИЦИРОВАННЫХ ГИМНАСТОВ**

### **Аннотация**

Настоящая статья посвящена актуальным вопросам разработки и внедрения методик интегральной подготовки спортсменов высокой квалификации в области спортивной гимнастики. Особый акцент сделан на техническую составляющую интегрального подхода, определяющую ключевые элементы готовности спортсмена, от уровня которой непосредственно зависят надёжность выполнения сложных комбинаций и художественное совершенство выступлений в рамках очередного олимпийского цикла. Автор обоснованно подчеркивается важность детальной разработки и научно-обоснованного выбора данной формы подготовки, поскольку игнорирование данного аспекта зачастую препятствует поиску оптимальных решений тренировочных задач.

**Ключевые слова:** педагогический процесс, технологические компоненты, корреляционный анализ, факторный анализ, средства подготовки, интегральная подготовка, техническая подготовка, двигательная подготовка, функциональная подготовка.



Integral training is characterized by the ability to coordinate and implement various aspects of preparedness in competitive activities - technical, physical, tactical, psychological, functional - and serves as a unifying and, perhaps, one of the most important aspects of an athlete's preparedness for important competitions [2,3,7].

Integral training should be understood as a process aimed at unifying, coordinating and implementing, in the context of training and competitive activities, various aspects of preparedness, quality and abilities, ensured by the use of narrowly focused tools that are analytical in nature and, by their structure, do not always fully meet the specific requirements of competitive activities [4].

The main task of improving technical skills in the annual training cycle is to create an optimal redundancy in difficulty, quality and reliability of the performed elements of the highest complexity, combinations, and combinations in general. The main condition for the successful solution of this task is the optimal level of basic technical preparedness, which is laid in the periods of training preceding entry into the national team and continues as part of the national team itself.

In this regard, the following research **objective** was put forward: To consider the feasibility of using the components of the integrated training of highly qualified gymnasts in a complex and their interpretation in the process of pre-competition preparation for official competitions.

**Research methods.** Pedagogical observations, timing of training sessions, correlation, factor analysis, calculation of the coefficient of "reliability" of competition combinations.

As a result of many years of research, a system of integrated training for gymnasts and its main technological components were developed based on a prospective-prognostic approach, as well as the principles of advanced development and

optimal redundancy [1].

During the pre-competition training sessions of the Russian national teams, 7 technological components of the integrated training of highly qualified gymnasts were tested. During the training of highly qualified athletes, it was revealed that in the structure of the processes that ensure the activity of highly qualified athletes (biomechanical, physiological, psychological, pedagogical), the pedagogical process is a kind of input into the system, to which the main information about the condition and capabilities of athletes should be submitted. External management of the gymnasts' activities is carried out through pedagogical influences [1].

In addition to the types of training generally accepted in sports theory, artistic gymnastics distinguishes a number of types of training, such as basic, conjugate, rotational, jumping, acrobatic, choreographic, centralized, mid-mountain, pre-competition, competition, etc.

Physical and technical training are the main points of support through which the central axis of the system of integrated training of highly qualified gymnasts passes. Around this axis, as around a consolidating rod, the above types of training are grouped and their structural interaction is built.

The types of training do not have clear boundaries that sharply separate them from each other. Interacting with each other, they seem to flow into each other, forming non-rigid objects. Multidimensional conjugation of various types of training and, above all, physical and technical conjugation is one of the leading trends in the development of the modern system of integrated training of highly qualified gymnasts. This is how it differs from the classical system of training gymnasts, in which the analytical principle of clear separation of types of training dominates (table 1).

**Table 1**

Technological components of integrated training

№ s/n	Distribution of technological components of integrated training based on their prospective and prognostic significance	The level of significance of the components of integrated training
1.	Team selection system: the main indicators of preparedness that must be taken into account during selection include: sports results, the degree of compliance with the target model in terms of content and difficulty of voluntary exercises, the dynamics of sports results, stability of performance, fulfillment of an individual plan, fulfillment of model characteristics of special physical training (SPT).	$r=0,90-0,955$
2.	An important technological component is the options for constructing pre-competition stages of preparation. The use of each option depends on the program and regulations of the competition.	$r=0,85-0,895$
3.	The concept provides for ongoing tactical correction of training load parameters depending on the individual condition of specific gymnasts.	$r=0,80-0,845$



continuation Table-1

4.	The main task of improving technical skills in the annual training cycle is to create an optimal redundancy in difficulty, quality and reliability of the performed elements of the highest complexity, connections, combinations in general. The main condition for the successful solution of this task is the optimal level of basic technical preparedness, which is laid in the periods of training preceding entry into the national team and continues as part of the national team itself.	$r=0,75-0,795$
5.	The level of SFP should provide the necessary basis for successfully solving the problems of technical training of the country's strongest gymnasts.	$r=0,70-0,745$
6.	The organizational and managerial aspect is of great importance. It has been revealed that the involvement of promising young gymnasts in centralized training together with their personal trainers significantly increases the motivation of trainers and ensures the improvement of their pedagogical skills. It has been shown that in this way the problem of training not only qualified gymnasts, but also highly qualified trainers is comprehensively solved.	$r=0,65-0,695$
7.	It is advisable to introduce control training sessions on technical and physical training on the first and last days of each training camp. At the same time, the first control training sessions allow us to assess the volume and quality of work done by gymnasts on site, without providing documentary reporting, which often does not provide entirely reliable information.	$r=0,60-0,645$

The choice of training tools is determined by the tasks, the solution of which ensures timely entry into the target model of competitive activity and the achievement of predicted results in the upcoming Olympic cycle. The study showed that among the training tools used in the system of

integrated training of highly qualified gymnasts, special training tools dominate (table 2). Training tools are also interconnected with each other. At the same time, the solution of special tasks of different types of training occurs in parallel in the process of performing the same exercises.

Table 2

List of training tools at the stage of pre-competition training of highly qualified gymnasts

Training tools and their percentage ratio									
1	2	3	4	5	6	7	8	9	10
Competitive exercises in all types of gymnastics all-around (combinations in general)	Parts of competitive exercises (elements and combinations from competitive combinations)	Vaults (in general and separately by phases in easy and difficult conditions)	Educational and training exercises (combinations, connections, elements, phases, jumps)	Basic, profiling, associated, preparatory and introductory special exercises	SFP exercises to maintain and develop the physical qualities required for highly qualified gymnasts	Acrobatic exercises	Trampoline jumping	Choreographic exercises (for gymnasts)	Additional training tools
23%	15%	3%	15%	14%	13%	7%	2%	4%	4%

In the system of training highly qualified gymnasts, general physical training (GPT) exercises (sports games, running, swimming, etc.) are used in limited quantities as a means of recovery and psychophysiological relaxation. The share of GPT may increase somewhat after the main competitions of the year.

Technical training of gymnasts oriented towards the highest sports mastery is both a system and a process of teaching gymnastic exercises of progressive complexity. Training of gymnasts is inextricably linked with the processes of formation and improvement of sports technique.

In the process of technical training, classical pedagogical problems are posed and solved: "what to teach?", "how to teach?" and "and when to teach?". Here, the pedagogical skill of the coach and his professional qualification as a teacher of big gymnastics are especially clearly manifested. Therefore, it can be said that technical training is the most pedagogical type of training.

One of the main tasks of technical training of gymnasts is the formation of highly developed technical mastery. It is characterized by such a level of preparedness, at which the ability to technically perfectly (i.e. technically competently, without errors, artistically and stably) perform gymnastic exercises of varying complexity - from elementary to the most complex - is revealed. Improving technical mastery is one of the most important components in the technology of integral training of gymnasts. Technical mastery is impossible without mastering optimal technique.

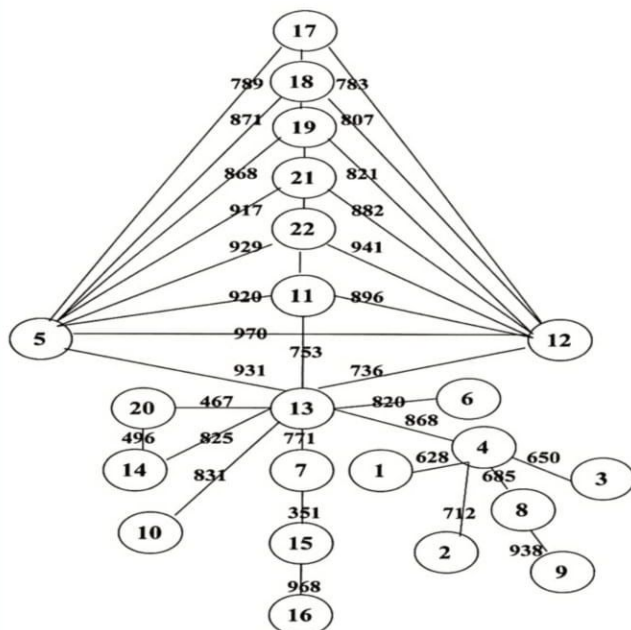
A necessary condition for mastering the optimal technique of performing a gymnastic exercise

is a certain level of the gymnast's preparedness (technical, physical, functional, psychological and theoretical). It is also called the initial training base. This level, as well as the composition of the initial base, determines the "motor demand" of a given exercise. The more complex the exercise, the higher this demand.

Formation and improvement of technique is carried out in the process of performing gymnastic exercises (basic, preparatory, introductory and main). This process is cyclical. In each attempt to perform an exercise, it begins with a setup, is accompanied by pedagogical instructions from the coach and ends with the movements of the gymnast - i.e. a biomechanical process, the quality of which is assessed by the coach or the gymnast himself. The result is compared with the target model and the whole process is repeated again and again. In order to evaluate the relationships between the parameters of integral preparedness and the list of training tools, correlation analysis was used [6]. Correlation analysis was considered as a preliminary procedure of factor analysis, associated with the allocation of groups of closely correlated components of the gymnasts' training process [4,5].

To interpret the results of factor analysis, the essence of the factors was identified, and on this basis their names were determined: the unevenness in the distribution of factor weights by factors was analyzed.

According to the data presented in the diagram, the most significant contribution (39,8%) is made by the first factor. This includes a group of training load indicators related only to combinations.



**Scheme.** Correlation relationship between training and competitive loads

**Note:**

Legend: 1. number of training days. 2. Number of training sessions. 3. net training time. 4; total number of elements. 5. total number of combinations. 6. total number of approaches. 7. number of elements of the highest difficulty group. 8. number of SFP elements. 9. number of SFP approaches. 10. intensity by elements. 11. intensity by combinations. 12. number of stable combinations. 13. number of technical training elements. 14. number of technical training approaches. 15. number of elements in trampoline exercises. 16. number of approaches in trampoline exercises. 17. number of combinations in floor exercises. 18. number of combinations in pommel horse exercises. 19. number of combinations in rings exercises. 20. number of vaults. 21. number of combinations in exercises on the parallel bars. 22. number of combinations in exercises on the horizontal bar.



The obtained indicators in the first factor with high weight coefficients are the main ones at the pre-competition stage of preparation ( $r=0,836-0,967$ ). This is important for planning and monitoring training loads at this stage of preparation.

In the center of the correlation scheme are indicators 12 and 5: the number of stably performed combinations ( $r=0,917$ ) and the total number of performed combinations ( $r=0,957$ ). The first group includes indicators of the number of combinations ( $r=0,957$ ) and the intensity of work on combinations ( $r=0,876$ ), the second - indicators that characterize the volume ( $r=0,568-0,778$ ) and the intensity of work (el. per approach,  $r=0,825$ ) and el. per min. ( $r=0,831$ ), in vaults ( $r=0,677$ ).

The upper part of the diagram shows the indicators related to combinations (from  $r=0,876$  to  $0,970$ ), both general and for individual types of gymnastics all-around (from  $r=0,619$  to  $0,926$ ). For these indicators, the correlation relationships are very high (from  $r=0,619$  to  $0,916$ ).

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The analysis shows the existence of two main groups of indicators reflecting the course of preparation of the competition program.

Other groups of parameters (time, SFP, trampoline and acrobatic training) have an independent meaning. They characterize individual aspects of gymnasts' preparation for competitions and are interconnected with the main groups.

The correlation matrix obtained at the first stage was transformed into a matrix of factor weights. As a result of factorization of 22 training load indicators, which carry the most significant information about the phenomenon under study, 5 factors were identified, which have different contributions to the total variance.

To interpret the results of factor analysis, the essence of the factors was identified, and on this basis their names were determined: the unevenness in the distribution of factor weights by factors was analyzed.

According to the data presented in the diagram, the contribution of the first factor (39.8%) is most significant. This included a group of training load indicators related only to combinations. The obtained indicators in the first factor with high weight coefficients are the main ones at the pre-competition stage of preparation and are most significant for planning and monitoring training

loads.

At competitions in artistic gymnastics, teams of judges evaluate only combinations in a complex. This means that athletes realize their accumulated potential by performing combinations in individual events and gaining a certain amount of points in the all-around for each day of the competition. On the basis of integral combinations, certain features of the upcoming competitive activity are modeled, thereby bringing training and competition modes closer together.

Of all the training load indicators included in the first factor, the most informative for monitoring the gymnast's readiness for competitions is the indicator of the number of consistently performed combinations ( $r=0,893$ ), which is determined as a percentage of the total number of performed combinations ( $r=0,916$ ), both in each individual event and in the all-around. All of the above combination indicators are associated with the highest values of the weight coefficient with this factor. In this regard, the first factor is interpreted as the factor of "the number of performed combinations". The second factor. Its contribution to the total variance is 22.8%. The highest weight coefficient from the connecting group of training load indicators corresponds to the number of performed elements of the highest difficulty group (technical training,  $r=0,771$ ). This factor characterizes the systematic use of special preparatory exercises for selective improvement of elements of competitive actions, increase of the general level of functional capabilities of the body, development of specific and maintenance of general working capacity at a sufficiently high level. Based on the purpose of the training load indicators included in the second factor, this factor can be conditionally called "technical preparation".

The third factor is the "Special physical training" factor, since the indicators of the number of exercises performed ( $r=0,892$ ) and SPT approaches ( $r=0,922$ ) are very high. The high percentage of significance of this factor (19.8%) indicates the need for targeted development of basic physical qualities at the stage of sports improvement, in order to improve the performance and special endurance of gymnasts of the studied age and level of training.

The fourth factor, which accounts for 13.1% of the total sample variance, reveals significant weights in terms of the number of exercises ( $r=0,771$ ) and approaches on the trampoline ( $r=0,968$ ), the number of preparatory exercises performed (including on the trampoline) and their "utilization" in competitive combinations on the pommel horse and floor exercises ( $r=0,902$ ). All this gives reason to interpret it as the "trampoline and acrobatic training" factor. The fifth factor (4.6%) is determined by closely interrelated indicators of the number of training days, training sessions, and net training time ( $r=0,717$ ), and this factor accounts for 4.6% of the total sample



variance. Therefore, we believe that the factor of indicators characterizing the time features at the pre-competition stage can be called the factor of "quantitative and time indicators).

The results of the factor analysis were recommended for use in the process of developing the structure and distribution of load components when planning training tools in educational and training sessions, micro- and competitive meso-cycle of gymnasts at the stage of sports improvement.

**Thus**, taking into account the practical feasibility of monitoring and assessing the level of gymnasts' sports and technical skills, the "reliability" coefficient of competitive combinations in all-around events was used: average score - 1-2 points, reliability - up to 0,1-0,2; average score - 3-4 points, reliability - up to 0,2-0,4; average score - 5-6 points, reliability - up to 0,4-0,6; average score - 7-8 points, reliability - up to 0,6-0,8; average score - 9-10 points, reliability - up to 0,8-1,0. The results of the correlation analysis showed that the most informative parameters of the training load (at  $r=0,875-0,955$ ) at the competitive stage of gymnasts' preparation for important competitions are: the number of consistently performed combinations; the total number of elements performed; training time; the number of SFP elements; the number of elements of the highest complexity; the intensity of the training load; the percentage of successfully performed combinations and vaults.

The results of the correlation analysis allowed

us to determine the relationship and mutual influence of the most significant training load indicators used by gymnasts at the competitive stage of preparation. Factor analysis revealed, according to the level of significance of the training load indicators, five factors with different contributions of each of them to sports and technical mastery: the number and intensity of combinations and vaults performed (contribution – 50,8%); technical training (17,7%); the number of exercises performed and the level of SFP (15,8%); trampoline and motor training (11,1%); quantitative and time indicators (4,6%).

The materials of the analysis of experimental studies **convincingly indicate** that:

- statistically substantiated and tested in the process of the main experiment training loads of varying volume and intensity and their rational distribution in training sessions and weekly microcycles;

- control standards and preparatory and developmental complexes of SFP of selective orientation, preparatory exercises according to STP in types of gymnastics all-around; - monitoring of body weight of gymnasts - which formed the structural basis of the complex program of micro- and competitive mesocycle, have a high level of theoretical and practical significance, allow to consistently master and improve the program requirements of candidates and masters of sports and can be recommended as an effective option for training promising gymnasts aged 13-15 at the stage of sports improvement.

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