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Factors of technical training objectively influencing the process of mastering elements in gymnastic all-round events

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Abstract
Purpose: Gymnastics study of technical training factors that objectively influence the process of mastering elements in the all-around competition.
Methods: Analysis and generalization of literature data, analysis of competitive activity using request monitoring methods, forecasting and modeling based on expert evaluation, instrumental research methods and methods of mathematical statistic
Keywords: training, technical difficulty, integral approach, leading factors, readiness, assessment, informative indicators, control, motor abilities.

Introduction

The most effective means of controlling the process of teaching gymnasts exercises on apparatus are: structuring of training programmes depending on the degree of gymnasts' preparedness with the possibility and operative solution of intermediate tasks. In addition, an important problem to solve is the accentuated influence on the leading factors of integral training, which objectively increase the quality and reliability of motor skill formation.

In the most general form, the control model includes the control object (gymnast), his readiness (state), the studied exercise, i.e. the main elements of the training system. In the process of purposeful control the athlete is subjected to controlling and perturbing influences. The result is a learnt exercise. The main objective of this process is to improve the efficiency and effectiveness of the training system. To make a decision on the management of this system it is necessary to determine its goal, the goals of its individual subsystems and alternative options for achieving these goals, which are compared according to certain criteria of effectiveness, as well as to choose the most acceptable for a given situation way of organising the solution of the problem on the basis of the leading principles.

At the present stage of development of the theory and practice of artistic gymnastics, the majority of specialists link the successful solution of the problem of training elements on gymnastic apparatus of different complexity for gymnasts of different fitness levels to the identification of the significance of factors determining the level of readiness for effective training and competitive activity, and the improvement of the training process management system. This is due to the fact that competitive success accompanies athletes who demonstrate at a high technical level elements of record complexity, which requires the performer to maximise the manifestation of his motor abilities (1,3). Optimal preparation of an athlete for the performance of each specific element presupposes the presence of sufficiently clear knowledge about the regularities of the flow of the activity, which should be formed in advance and then realised in the process of performance (2). Preliminary, in order to study the opinion of coaches-practitioners about the possible basic components of the technical actions of the strongest gymnasts, a questionnaire survey was conducted, which allowed us to identify the priority components of these actions.

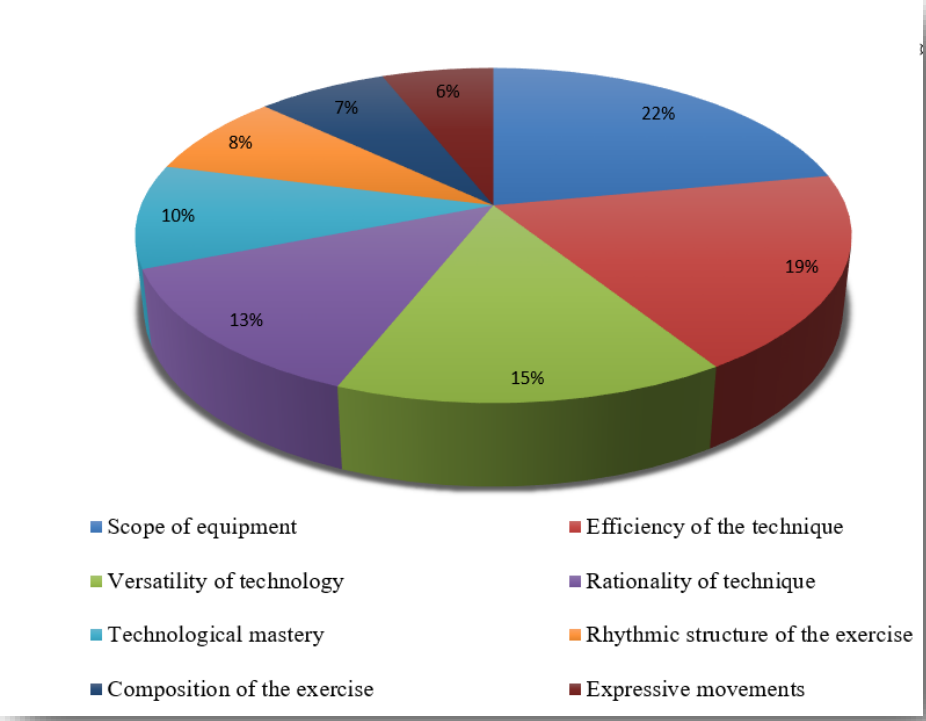
Results and discussion

According to the surveyed coaches, the composition of technical components proper, in order of importance, is characterised by:
- volume of technique (22%);
- efficiency of technique (19%);
- versatility of technique (15%);
- rationality of technique (13%);
- mastery of technique (10%);
- rhythmic structure of the exercise (8%);
- composition of the exercise (7 %);
- expressiveness of movements (6%).

In turn, each component of actions is subdivided into component parts that influence the final result. According to the questionnaire data it was established that technique depends on the following factors:
- technique of execution of individual elements (30.5 %);
- accuracy of landing and push technique (17.7 % each);
- accuracy of transition from one element to another (16.4 %);
- element height (12.7 %).

The difficulty components are characterised in the following rank order:

Fig 1. Composition of the basic components of the technical actions of the strongest gymnasts themselves



- overall difficulty of the element (43.7 %);
- structural group of the element (32.7 %);
- all-around type (14.7 %);
- gymnast's fitness (9.8 %).

Rhythm components are represented by the following elements:

- increase of the progressive speed of the OCM (36,7 %);
- dynamism of the exercise (31,7 %);
- rationality of effort distribution (28.3 %).

Expressiveness of exercise performance depends on:

- ease of exercise performance (25,2 %);
- amplitude of movements and beauty of lines (22,3 % each);
- body proportions and appearance (22 %);
- general impression (15,7 %);
- correspondence of weight and height indices to competitive exercises (10,5 %);
- clarity of compositional pattern (4.8 %).

The informativeness analysis allowed us to distinguish three groups of components:

1) that showed a reliable relationship in all groups ($p<0.01$, $p<0.05$);

Table 1. Informativeness of technical action indicators in gymnastic all-round events

	Components	V/U	Pommel horse	Circle	O/P	Dips bar	Hor.bar
	1	2	3	4	5	6	7
1.	Difficulty of the exercise	0,73**	0,65*	0,69**	0,42	0,56*	0,51**
2.	Programme intensity	0,63**	0,55*	0,57**	0,10	0,20	0,14
3.	Exercise technique	0,79**	0,69**	0,68**	0,68**	0,47	0,51**
4.	Coherence	0,41	0,80**	0,62**	0,76**	0,75**	0,72**
5.	Height of throwing and pushing elements	0,74**	0,45	0,49**	0,52*	0,55*	0,52**
6.	Push-off technique (kurbet, anti kurbet)	0,79**	0,49*	0,40**	0,74*	0,64*	0,33
7.	Exercise rhythm	0,52*	0,65*	0,58**	0,50*	0,42	0,40*
8.	Handstand	0,69**	0,77**	0,73**	0,79**	0,49*	0,58**
9.	Ease of performing the elements	0,53*	0,78**	0,66**	0,60*	0,66**	0,63**
10.	Amplitude of movements	0,61**	0,80**	0,70**	0,58*	0,70**	0,66**
11.	The beauty of the lines	0,69**	0,82**	0,75**	0,57*	0,42	0,44**
12.	Body proportions	0,66**	0,60*	0,56**	0,29	0,34	0,28
13.	Turn in handstand with shoulder forward	0,79**	0,77**	0,77**	0,40	0,39	0,36*
14.	Turn in handstand with shoulder backwards	0,75**	0,72**	0,72**	0,49	0,52*	0,43**
15.	Acrobatic jumps	0,66**	0,59*	0,58**	0,30	0,62**	0,44**

Table 2. Informativeness of technical action indicators of gymnasts of different qualifications

N	Qualification	1 category - Candidate of MS			Master of sport			Master of sport international class		
	Components	$x_{average}$	σ	R	$x_{average}$	σ	R	$x_{average}$	σ	R
1.	*Exercise difficulty*	4,5	0,54	0,76	4	0,83	0,60	4,6	0,90	0,66
2.	*Programme intensity*	4,4	0,56	0,75	39,4	79,3	0,57	28,6	50,1	0,40
3.	*Exercise technique*	4,5	0,49	0,78	5,6	2,62	0,59	3,4	0,75	0,59
4	*Consistency of action*	4,4	0,64	0,73	21,9	54,9	0,64	13,3	31,4	0,56
5.	*Height of throwing and pushing elements*	4,4	0,58	0,74	0,5	0,02	0,15	0,47	0,02	0,40
6.	*Push-off technique (kurbet, anti kurbet)*	4,7	0,14	0,69	3,7	0,82	-0,16	3,8	0,92	0,27
7.	*Exercise rhythm*	4,4	0,63	0,74	4,4	0,63	0,76	4,2	0,92	0,78
8.	*Handstand*	4,4	0,62	0,75	4,4	0,57	0,74	4,3	0,74	0,75
9.	*Ease of performing the elements*	4,4	0,59	0,78	4,3	0,70	0,71	3,9	1,04	0,66
10.	*Amplitude of movements*	4,4	0,50	0,82	4,3	0,68	0,76	4,1	0,84	0,70
11.	*The beauty of the lines*	4,5	0,48	0,80	3,6	0,87	0,62	4,0	0,78	0,72
12.	*Body proportions*	4,4	0,51	0,81	4,4	0,60	0,83	4,2	0,98	0,78
13.	*Turn in handstand with shoulder forward*	4,3	0,60	0,76	4,5	0,56	0,75	4,3	0,95	0,77
14.	*Turn in handstand with shoulder backwards*	4,4	0,53	0,74	4,5	0,36	0,80	4,1	1,19	0,79
15.	*Acrobatic jumps*	4,2	0,58	0,77	4,5	0,38	0,76	3,9	1,29	0,80

2) showing partial (more than three reliable values) interrelation ($p<0,01$, $p<0,05$);

3) showing no reliable interrelation in the majority of the studied indicators ($p>0.05$).

As a result of correlation analysis, it was found that all informative components showed a high degree of reliability, which was determined by calculating the correlation coefficients between the results of repeated examination ($r=0.85$-0.90).

Thus, the study of the components of the gymnasts' own basic actions for compliance with the criteria of informativeness, reliability and equivalence allowed to reduce them to a reasonable minimum of - 15.

It is known that individual components do not manifest themselves in isolation from each other, but have an integral impact on the final result of learning. In order to study the integrated influence, we calculated multiple correlation coefficients, which allowed us to determine the total contribution of each individual component to the final result. The obtained results indicate that the main components influencing the learning process in artistic gymnastics are the complexity of the studied exercise, the peculiarities of technique and rhythmic structure of the studied movement, which are manifested in complex interaction with each other. This is evidenced by their high degree of correlation with the competitive result at the level of $p<0.01$.

Conclusion

In practical activity, the coach needs to know not only the composition of means, methods and techniques that form the basis of training, but also their possible combinations. Having an accurate quantitative assessment of these actions allows the coach to effectively monitor and manage the training process.

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