



Analysis of the effectiveness of performing technical actions to control the special training of arm-wrestler athletes

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PhD, Associate Professor **E.V. Markin**¹

PhD, Associate Professor **A.I. Rakovetskiy**¹

¹Russian State Agrarian University - Moscow Timiryazev Agricultural Academy, Moscow

Corresponding author: kupec2007@mail.ru

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Abstract

Objective of the study is to identify the relationships between the indicators of activity, efficiency, effectiveness, and effective variability of the technical-tactical actions among student arm wrestlers.

Methods and structure of the study. To determine the parameters for analyzing competitive activity, a pedagogical observation was conducted of the competitive and training process of the arm-wrestling athletes of the national team of the Russian State Agrarian University – Moscow Timiryazev Agricultural Academy. Video recordings of 145 bouts held in the period from 2024 to 2025 at all-Russian and regional competitions among students were studied. The level of technical-tactical preparedness of the arm wrestlers was assessed by the effectiveness of performing technical actions, the starting position, and the attacking action. The identification of the connections between the indicators of technical-tactical preparedness was carried out using correlation analysis.

Results and conclusions. All the indicators of technical-tactical preparedness in arm wrestling were interconnected. The efficiency of performing technical actions varied depending on the presence of classification groups and successfully performed technical actions. In turn, the effective variability was connected with effectiveness (0.58) and activity (0.52). Effectiveness was also connected with activity (0.55), i.e., a change in the number of points in competitions entailed a change in the number of successful attempts to perform attacking techniques. In the course of the training process, coaches need to conduct conditioned sparring with various tactical tasks against fighters with oppositely named basic stances. It has been established that the combination of technical-tactical actions increases the volume, efficiency, and effectiveness of the technical-tactical arsenal of the athletes, giving arm-wrestling athletes a tactical advantage in conducting bouts.

Keywords: arm wrestlers, students, effective variability, efficiency, effectiveness, indicators of activity.

Introduction. The modern growth of the level of competitive struggle at arm-wrestling competitions is characterized by the complication of technical-tactical actions, primarily by an increase in the speed of attacking actions and the tactics of conducting a bout. The increase in the requirements for an athlete's preparedness and the trends of growth in physical load create conditions for the effective planning of the training process in arm wrestling, which is the key to high results at competitions [1, 6].

Arm-wrestling classes with students of non-sports universities contribute to the development of physical qualities such as strength, agility, endurance, reaction

speed, as well as moral-volitional qualities, which largely determine the preparation for future professional activity and contribute to introduction to a healthy lifestyle [11, 14]. In addition, arm wrestling is an accessible sport for a large number of students [9, 11].

Technical-tactical preparedness in many martial arts is one of the main parts of sports preparation and directly affects the result in competitions. In arm wrestling, there are methods for determining technical-tactical preparedness by various indicators and in various phases of the bout [4].

The indicators of activity, efficiency, effectiveness, and effective variability reflect different aspects of an



athlete's technical-tactical preparation and help to assess the success of actions in a bout, since they must be interconnected. These indicators give a complete picture of the merits and shortcomings in an arm wrestler's preparedness. In addition, the efficiency of performing technical actions best reflects the strength of the opponents in the bouts, which makes it possible, by selecting partners, to regulate technical-tactical preparedness [3, 10].

To determine the level of technical preparedness in arm wrestling, special scales for assessing the key elements (the starting position and the attacking actions) are used [15].

Tactical preparedness is determined in training bouts according to the coach's task. The effectiveness of the tactics is assessed by the ability to realize an advantage at the beginning of the bout or to prolong the bout [5, 12, 13].

Objective of the study is to identify the relationships between the indicators of activity, efficiency, effectiveness, and effective variability of the technical-tactical actions among student arm wrestlers.

Methods and structure of the study. The methodological basis of the study was the analysis and generalization of literary sources, pedagogical observations, video recording, shorthand records of bouts, as well as methods of mathematical statistics.

The level of technical-tactical preparedness of the arm wrestlers was assessed by the effectiveness of performing technical actions – the starting position and the attacking action.

The activity of technical-tactical actions was assessed using a statistical analysis of competitive activity by the number of successful actions (attacks for a score) and the average time spent on one attacking or defensive action (the athlete's activity in the first 30 seconds, in the main time, and in the last 10 seconds of the bout).

The efficiency of the actions was assessed using the formula:

$$\text{Efficiency} = \text{Number of successful actions} / \text{Total number of actions} \times 100\%.$$

The effectiveness of the technical actions was determined through the indicator of the total number of attacking actions during competitions. The variability of the technical-tactical actions was assessed as the degree of diversity of the variants of performing attacking actions (an attack via the "top," "hook," "push," "top roll") [7]. For this, the percentage ratio of the frequency of using a technique to the total number of used actions was applied.

The identification of the connections between the indicators of technical-tactical preparedness was carried out using correlation analysis.

To determine the parameters for analyzing competitive activity, a pedagogical observation was conducted of the competitive and training process of the arm-wrestling athletes of the national team of the Russian State Agrarian University – Moscow Timiryazev Agricultural Academy. Video recordings of 145 bouts held in the period from 2024 to 2025 at all-Russian and regional competitions among students were studied.

Results of the study and discussion. A bout in arm wrestling is characterized by a high motor density of technical actions [2, 8]. The technique of conducting a bout consists of the following positions: stances (left-sided, right-sided), starting position, attack phase, realization of advantage. The starting positions of the arm-wrestling athletes were analyzed, of which about 79.3% of the athletes conducted bouts in a right-sided stance, 20.1% – in a left-sided one, and a mixed-sided stance – 0.6%. Arm wrestlers in a bout with a left-sided stance had a slight technical-tactical advantage. Thus, they finished the bout with a victory in 50.2% of the cases, compared with athletes with a right-sided stance, who had victories in 49.4% of the cases. Athletes who changed the position of the stance had only 0.4% of victories.

A feature of arm wrestling, as in many martial arts, is the possibility of combining starting positions and attacking actions. The starting position was consid-

Table 1. Indicators of technical-tactical actions in arm wrestling

Indicators	Starting position			Attacking actions			
	Right	Left	Mixed	Top	Hook	Push	Top roll
Volume, %	79.3	19.1	1.6	11.6	1.3	16.7	4.8
Efficiency, %	63.7	66.5	15.1	62.5	60.6	60.5	69.1
	48.4			62.2			
Effectiveness, points	2.4	2.8	0.5	1.1	1.1	1.4	4.8
	1.9			1.73			



ered as the position in which the athletes grip their hands, place their elbows, hand, and forearm, and also grip the table peg with the free hand. By attacking actions was understood the attack phase – to achieve an advantage over the opponent by bringing his arm to an angle of 45° relative to the surface of the table. Four variants of the attack phase were considered: top, hook, push, and top roll.

Table 1 presents the indicators of the starting positions and the variants of the attacking actions from the technique of gripping the hand at competitions.

Thus, the efficiency of the sports result at competitions depended by 48.4% on the starting position. More efficient was the left-sided stance, which was more effective than the right-sided one by 2.8% and the mixed one by 51.4%. This was also confirmed by the analysis of effectiveness, which was slightly better among the athletes with a left-sided stance (2.8 points).

The most efficient technique of gripping the hand at competitions was the “top roll” attack (69.1%), and it was also the most effective (4.8 points). The other attack techniques were slightly lower than the top roll, but also showed high efficiency, while in terms of effectiveness they lagged far behind. Therefore, the application in training sessions of various tasks on the technique of attack in a bout is an important component of technical-tactical preparation in arm wrestling.

It is worth noting the great potential of the technique of conducting a bout in the realization of advantage, but it is not presented in this work; among arm wrestlers it should also be improved in the process of training and competitions.

The indicators of activity, efficiency, effectiveness, and effective variability were studied by starting positions and attacking actions, the average values of which are presented in Table 2.

Table 2. Effectiveness of technical techniques among student arm wrestlers in bouts, %

Statistical values	Activity	Efficiency	Effectiveness	Effective variability
$\bar{X}$	6.1	42.2	10.1	8.8
m_x	0.36	2.3	1.09	0.25
σ	1.8	11.7	5.47	1.27
$m\sigma$	0.25	1.65	0.73	0.17

The calculation of Blackman's linearity criterion made it possible to conclude that the connection

between the indicators of the technical-tactical preparedness of student arm wrestlers is nonlinear. Therefore, the strength of the connection was better characterized by the correlation ratio (Table 3).

Table 3. Correlation matrix of the indicators of technical-tactical preparedness

Indicators	Activity	Efficiency	Effectiveness	Effective variability
Activity	-	0.51	0.55	0.52
Efficiency	-	-	0.72	0.70
Effectiveness	-	-	-	0.58
Effective variability	-	-	-	-

A change in activity entailed a change in efficiency (0.51). Most likely, this is connected with the fact that in a bout an arm wrestler had various temporal opportunities for performing technical actions. This was reflected in the successful or unsuccessful outcome of the bout. The correlation ratio showing the connection between efficiency and effectiveness was equal to 0.72. In addition, efficiency was connected with effective variability (0.70), i.e., the efficiency of performing technical actions varied depending on the presence of classification groups and successfully performed technical actions. In turn, effective variability was connected with effectiveness (0.58) and activity (0.52). Effectiveness was also connected with activity (0.55), i.e., a change in the number of points in competitions entailed a change in the number of successful attempts to perform attacking techniques.

Conclusions. All the indicators of technical-tactical preparedness in arm wrestling are interconnected. The indicator of the efficiency of performing technical actions reflects the level of technical-tactical preparedness of arm wrestlers.

In the course of the training process, coaches need to conduct conditioned sparring with various tactical tasks against fighters with oppositely named basic stances. It has been established that the combination of technical-tactical actions increases the volume, efficiency, and effectiveness of the technical-tactical arsenal of the athletes, giving arm-wrestling athletes a tactical advantage in conducting bouts. As sports mastery grows, it is necessary to increase the variability and combinational nature of the technical-tactical set of attacking actions in arm wrestling.



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