Efficiency of using biofeedback methods in the training process of qualified swimmers

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PhD, Associate Professor **A.A. Tretyakov**[1,2]
PhD, Associate Professor **O.V. Petrenko**[1]
PhD, Associate Professor **M.P. Spirin**[1]
Senior teacher **V.V. Agoshkov**[1]
[1]Belgorod State National Research University, Belgorod
[2]Putilin Belgorod Law Institute of Ministry of the Interior of Russia, Belgorod

Corresponding author: delphin87@inbox.ru

Abstract

Objective of the study was to determine the effectiveness of the application of biofeedback methods in the training process of highly qualified swimmers for the formation of skills to differentiate movement parameters during swimming.

Methods and structure of the study. A pedagogical experiment was conducted from October 2021 to February 2022. It was held on the basis of swimming sections in the sports schools of the city of Belgorod, sports schools «Spartak» and School No. 3. Qualified swimmers consisting of 65 people took part in the experiment. The control testing included the calculation of the reproduction error as a percentage of the values of speed, pace and "step" of swimming among athletes.

Results and conclusions. Most athletes, especially beginners, do not know how to optimally distribute forces at a competitive distance. The passage of a distance, as a rule, is characterized by an increase in swimming speed to a maximum, an increase in the frequency of strokes and a small length of the “step” at the beginning of the distance and a decrease in the speed and frequency of stroke movements towards its end. In our opinion, accurate reproduction and the ability to control the values of speed, pace and "step" of swimming will help athletes achieve the optimal combination between these elements of technology, which in turn will help to achieve the maximum level of speed.

Keywords: *sports swimming, technical training, biofeedback methods, training process, movement structure.*

Introduction. The growth of achievements in cyclic sports is closely related to the development of fundamentally new ways to optimize the management of the training process [1]. In the modern theory of sports, one of the main problems of the process of sports improvement is the development and experimental substantiation of means and methods of technical training [2]. Previous studies indicate that the irrational distribution of efforts in the cycle of movements, fluctuations in speed within the cycle, violations of the spatial and rhythmic structure of movements lead to unjustified energy consumption. At the same time, an athlete who has encountered the listed difficulties cannot fully realize his potential at competitions [3].

In this regard, solving problems related to the technical training of swimmers is difficult without studying the structure of movements, analyzing the mechanisms of their formation and the possibilities of controlling them [4, 5].

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The control testing included the calculation of the reproduction error as a percentage of the values of speed, tempo and “step” of swimming. Average scores were calculated. Further, the error and the corresponding percentage were calculated. The listed indicators were measured in swimming by the chosen method at a distance of 25 m.

The training sessions of the experimental group included exercises related to counting and regulating rowing movements at different distances, taking into account the intensity of the load, determining and regulating the frequency of movements during swimming; to maintain and regulate the ratio of the frequency and length of rowing movements at different distances with different load intensity; exercises to maintain a certain swimming speed and its change at a distance by swimmers. To accurately reproduce the results, the coach determined, recorded and communicated to the athletes the parameters of the pace, frequency and speed of swimming during the tasks. Feedback tasks were applied at the end of the main part of the lesson.

Results of the study and their discussion. The data obtained in the course of preliminary testing state the fact that qualified swimmers do not have the ability to consciously control the kinematic indicators of movements in swimming. Summarizing the results of preliminary testing, we can note the homogeneity of the experimental groups. It was revealed that with the increase in speed, pace and step of swimming, the error in reproducing the given characteristics decreases in swimmers.

As a result of the experiment, the errors in reproducing the given values and the growth of opportunities in self-regulation and the accuracy of self-assessment significantly decreased (tables 1-3).

As a result of the experimental training in the EG, the accuracy and stability of the subjective reproduction of the given values increased. These changes are valid. In the CG, the results indicate the absence of significant changes.

The results of determining the accuracy of reproduction of the given values of the pace and swimming step after the experimental training with BFB revealed a significant decrease in the relative error of self-assessment of these parameters in athletes from the EG, while in the CG there was practically no increase in the accuracy of self-assessment of the values of the pace and swimming step.

In sport, the greatest potential for performance improvement lies in the improvement of technical components and thus in the transformation of the relationship of these parameters into sports performance. Most athletes, especially beginners, do not know how to optimally distribute forces at a competitive distance. The passage of a distance, as a rule, is characterized by an increase in swimming speed to a maximum, an increase in the frequency of strokes and a small length of the "step" at the beginning of the distance and a decrease in the speed and frequency of stroke movements towards its end. Therefore, coaches pay great attention to the formation of good coordination of the elements of swimming technique, in order to use this coordination in the distribution of forces at a competitive distance.

Table 1. *Reproduction error in % of swimming speed, M±m*

Target swimming speed	EG		t	CG		t
	Before	After		Before	After	
25%	24,08±0,92	15,85±0,47	+	24,76±0,97	22,96±0,78	-
50%	20,85±0,37	7,93±0,17	+	20,53±0,52	18,78±0,38	-
75%	8,45±0,17	5,25±0,19	+	7,35±0,19	6,46±0,20	-

Table 2. *Reproduction errors in % of swimming tempo, M±m*

Target swimming pace	EG		t	CG		t
	Before	After		Before	After	
25%	22,43±0,52	17,44±0,61	+	21,63±0,86	21,09±0,93	-
50%	18,87±0,31	10,03±0,25	+	19,40±0,42	18,87±0,47	-
75%	10,05±0,25	5,35±0,18	+	10,60±0,33	9,16±0,27	-

Table 3. *Reproduction errors in % of swimming "step", M±m*

Set «step» of swimming	EG		t	CG		t
	Before	After		Before	After	
25%	25,43±0,69	11,43±0,47	+	26,21±0,73	25,11±0,92	-
50%	22,19±0,29	8,58±0,24	+	22,64±0,34	21,42±0,34	-
75%	13,46±0,28	3,82±0,20	+	13,27±0,32	12,39±0,58	-

Conclusion**s.** The data obtained confirm our assumption that improving the ability to perceive the parameters of vegetative and motor functions allows increasing the efficiency of swimming activity in general. In view of this, it can be assumed that the level of perception (accuracy of self-assessment) to a certain extent determines the effectiveness of specific swimming activities.

In our opinion, accurate reproduction and the ability to control the values of speed, pace and "step" of swimming will help athletes achieve the optimal combination between these elements of technology, which in turn will help to achieve the maximum level of speed.

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