

Training methodology and didactic bases of technical movements of 9-11-year-old volleyball players

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Abstract.

Any type of activity requires learning of physical movements. However, only in physical education and sport, mastering of physical movements is the core of training, because in this case physical movement acts as an object, a means, and a goal of improvement. In sports, training has its own peculiar features, the essence of which is that the bulk of the new material is learned by mastering a variety of physical movements in the form of physical exercises. The purpose of this study was to develop a methodology of physical movement training in volleyball using the fundamentals of the education activity theory and developmental training and to test the methodology's effectiveness in experimental work. The results of the pedagogical experiment were analyzed. The experiment was conducted to test the effectiveness of the developed approach for training of physical movements in volleyball and to check the level of knowledge of the basics of the techniques. In addition, the effects of the developed methodology on the ability of young volleyball players to differentiate their physical movements and the effects on their physical fitness were shown. In this study, an attempt was made to identify methods for solving the most important tasks of the trainer. Using the main points of the activity theory in education and developmental training, training children in the necessary techniques is faster and more efficient compared with traditional methods. In addition to directly teaching volleyball techniques, the experiment developed personality and mental abilities of children. For this purpose, trainees mastered the fundamentals of learning activities related to the ability to analyze the subject matter, identify the primary and secondary elements and their interrelation, control their movements, and evaluate the results and ways to achieve them. In the experimental group, the first training sessions showed a slight decrease in the physical density of the training sessions. This occurred because more time was spent on theoretical conversations, discussion of issues of interest, development of the training model and its use to test the main parts of the physical movements under study. This was subsequently compensated by a more rapid mastery of the technique of physical movements due to greater independence, greater activity during training sessions and fewer mistakes.

Key words: training methodology, technical competence, children, volleyball.

Introduction

One of the major issues of the theory and methodology of sports training is the objective of improving the process of training in effective physical movements in terms of intense sports activity [3, 12]. The special complexity of the abovementioned objective manifests itself in such agile sports as volleyball, where the elementary physical activities depend on both physical and mental processes and often on unpredictable movements with a diverse space-time structure.

In the theory and methodology of training in physical movements in sports practice, insufficient attention is currently paid to the content of proactive, developmental training [4, 10]. In volleyball, the traditional training methodology is mainly based on the overlearning of physical movements in the clearly regulated context, and the training process is mainly reproductive in nature and does not sufficiently consider the personality of the trainer and the trainee and their comprehensive cooperation. This supports the performance of physical movements in specific special conditions and prevents their generalization and use in unusual situations.

In their works, a number of researchers considered theoretical and methodological background for addressing various issues of effective training in terms of different mental and physical content and orientation [1, 5-7, 14]. Modern scientists have paid attention to problems in sport and in the training in physical movements in volleyball, where the lack of research using the activity theory in education makes this study quite urgent.

Methods

The following methods of research were used in addressing the tasks at hand: analysis and generalization of research and methodology literature on the tasks, pedagogical observations, questioning, pedagogical testing, pedagogical experiment, and methods of mathematical statistics.

Training sessions in primary training groups of the first year of training at the youth sports school in volleyball served as the experimental basis of the study. This study was conducted in two stages in 2015-2016.

The first, preliminary, stage was to conduct a methodological substantiation and theoretical analysis of the available information on the research topic of interest. The first stage included a period of training in the experimental methodology. The main objective during this time was to investigate the possibility of applying the activity theory in education in the training process at the youth sports school in volleyball and to develop the new content of training in movements and methodology of training in physical movements based on this theory.

The second stage was to develop and test the experimental methodology during training sessions in primary training groups of the first year of training at the complex youth sports school in volleyball at the premises of Miliyevska General Academic School I-III Degrees, Vizhnytsky District, Chernivtsi Region. The main pedagogical experiment was conducted at Karapchivska General Academic School I-III Degrees, Vizhnytsky District, Chernivtsi Region, with the experimental group and the control group formed based on grades 5-6. The experimental group consisted of young athletes engaged in the volleyball section based on the developed methodology. The control group consisted of the volleyball section trainees, who were receiving training according to the generally accepted methodology. Each group had 15 respondents. None of the experiment participants have ever been practicing volleyball.

Results

In volleyball, the training in physical movements using the traditional technique is based on the fact that a child receives training according to a pre-established scheme. Young athletes learn individual technique elements, and after mastering it, they try to combine them and perform a physical movement. At the same time, they acquire knowledge and master the skills given by the trainer in the ultimate form, and their acquisition of knowledge lacks elements of origin and development of the subject matter.

As a result, the correct organization of such training increases the following: positive motivation for volleyball; effectiveness of the training process; creative activity of the subjects under test, interest in learning the movement technique as a way of achieving a result. The training in each technique is structured so that the common patterns of the entire class of movements, which have been previously discovered by children themselves together with the trainer, are primarily mastered. These common movements for technique elements in volleyball consist of flexible movements of legs, hands and body. Only then, the mastery of the basic technique of a specific physical movement (serving, handling, spiking) is provided.

Young athletes were offered a training model featuring a spring fixed to a stationary support with its one end, with a metal plate attached vertically or horizontally (if necessary) to its free end, as well as a small basket that was slightly larger in size than the diameter of the ball. There was a small light ball above the spring on a rope attached to the support, and this ball could be lowered down, raised up or removed from the rope.

Using the spring, young volleyball players played with the ball, trying to understand its movement and strike the ball in different directions. In addition, a metal plate was used, which was fixed to the center of the spring horizontally to the tabletop. Together with the trainer, the trainees recalled which technique element should be used at the beginning of the game (serving the ball) and how it should be performed (tossing the ball with one hand and striking it in the air above the head with the other hand). Using the training model with the metal plate attached vertically, young athletes tried to set the same direction for the ball as during the overhand serving. To do that, they deflected the spring parallel to the necessary direction and released it. After that, the players tried to serve the ball in terms of putting the acquired knowledge into practice. If they failed to serve the ball for some reason, together with their trainer young athletes found and corrected mistakes that prevented the serving of the ball. Likewise, they mastered the striking of the ball and the underhand reception of the ball (see Fig. 1).

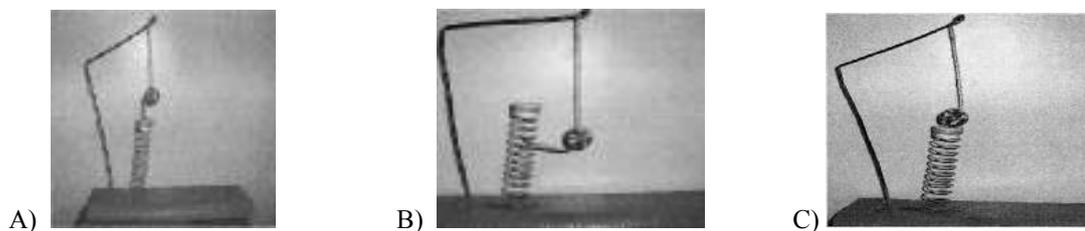


Fig. 1. Training model to form the concept of the technique of performing technical movements by young volleyball players in the experimental group: a) overhand straight serve; b) serve reception (underhand handling); c) handling of the second ball (overhand handling).

At the same time, significant attention was paid to the formation of theoretical knowledge of the basics of techniques of the volleyball player. When mastering physical movements, beginners learn to understand the essence of these movements to ensure the personal enhancement of trainees, master the technique elements of

the game faster and more efficiently, and to subsequently achieve great success in sports activities. This knowledge is tested by means of questioning at the beginning and at the end of the pedagogical experiment.

The technical competence of the subjects under test was evaluated using 5 major technique elements of volleyball players: serving, underhand reception, overhand handling, straight strike, blocking. The questioning was conducted to evaluate the level of mastery of the basics of technical movements. Technical standards were evaluated in terms of the number of effective movements out of 5 attempts, taking into account the accuracy of performance (see Table 1).

Table 1. Results of evaluation of the technical standards of knowledge of the basics of technical movements in volleyball at the beginning of the pedagogical experiment, scores

Item No.	Types of control standards	Experimental group (n=15)	Control group (n=15)	Error probability
1.	Overhand straight serve	2.41±0.30	2.46±0.30	p<0.05
2.	Serve reception (underhand handling)	2.12±0.23	2.02±0.45	p<0.01
3.	Handling of the second ball (overhand handling)	3.07±0.15	3.19±0.30	p<0.01
4.	Straight strike	1.92±0.23	1.64±0.15	p<0.05
5.	Blocking	2.23 ±0.30	2.39±0.30	p<0.05
6.	Evaluation of theoretical knowledge of the basics of technical movements (questioning)	3.29±0.30	4.36±0.38	p<0.01

The results at the end of the technical competence experiment for all types of tests show significant differences between the results in the control and experimental groups in favor of the latter. The high statistical significance ($p < 0.01$) is observed in terms of the underhand and overhand handling. However, as part of questioning, the theoretical survey on the basics of technical movements in volleyball shows that the experimental group has a substantial advantage in terms of serving, blocking and striking (see Table 2) with a statistical significance ($p < 0.05$).

Table 2 Results of evaluation of the technical standards of knowledge of the basics of technical movements in volleyball at the end of the pedagogical experiment, scores

Item No.	Types of control standards	Experimental group (n=15)	Control group (n=15)	Error probability
1.	Overhand straight serve	3.84±0.30	2.88±0.30	p<0.05
2.	Serve reception (underhand handling)	3.12±0.23	2.12±0.45	p<0.01
3.	Handling of the second ball (overhand handling)	4.07±0.15	3.02±0.29	p<0.01
4.	Straight strike	2.64±0.23	1.92±0.15	p<0.05
5.	Blocking	3.2 ±0.30	2.14±0.30	p<0.05
6.	Evaluation of theoretical knowledge of the basics of technical movements (questioning)	7.27±0.30	5.27±0.38	p<0.01

Discussion

The importance of understanding the technical nature of sport should be kept in mind when discussing the issue of training in physical movements in volleyball. Notably, special attention to the accuracy and consistency of performance of the basic movement by the volleyball player should be paid at the beginning of training. Moreover, the basis should include both theoretical and practical steps that explain how to teach and understand the fundamentals of technical movements (Raiola 2011c). Experience has shown that one of the most important issues for training in physical movements is that the trainee has a limited ability to perceive information. The effectiveness of the means deployed in training of volleyball players is based largely on methods of their application. The choice of methods depends on the objectives, level of training of athletes and their age, specific conditions, and trainer's professional skills [2, 9, 11, 13].

The results of our study confirmed and supplemented the already known observations, as well as contributed to the acquisition of completely new data in terms of the issue studied. The importance of effective support for the development of a sensory-motor integration appears to be one of the most important objectives that should be observed for each sports system. However, it may happen that the trainer supports the sensory-motor development of the trainee by means of obsolete methods such as physical exercises based on a simple repetition of movements related to visual and motor ability. This method is inefficient because "these abilities can not be considered as muscle training, but as the knowledge that must be acquired and realized." (Beery, 2000).

The results of our studies support the data that the physical information is memorized in the form of an image that is formed through demonstration. It is a fair assumption to say that the image is better than words, and the demonstration is better than explanation [8, 10].

The data show that the visual comprehension of a physical movement improves the technical competence, namely: overhand straight serve, serve reception (underhand handling), handling of the second ball (overhand handling), straight strike and blocking. In addition, this fact contributes to raising the level of knowledge of the basics of technical movements of young athletes.

Information (Raiola Gaetano, 2012; Gaetano Raiola, 2014; Resende Rui, Sarmiento Hugo, Falcão William, Mesquita Isabel, Fernández Juan, 2014; Filipe Manuel Clemente, Fernando Manuel Lourenço Martins, Rui Sousa Mendes, 2015) on the importance of technical skills in volleyball leading to victories at important competitions both at the initial and professional levels (Asterios Patsiaouras, Athanasios Moustakidis, Konstantinos Charitonidis, Dimitrios Kokaridas, 2011), as well as on the training methodology and didactic principles of training in volleyball for beginners has been supplemented. Information on coaching behaviors and the type of feedback they provide to young volleyball athletes (Maria Giannousi, Fereniki Mountaki, George Karamousalidis, George Bebetos, Efthimis Kioumourtzoglou, 2016) laid the foundation for the study.

Information on the theoretical statement and the experimental validation of the model of training of 9-11-year-old children in basic technical movements in volleyball is completely new. It contains theoretical and practical guidelines aimed at increasing the level of technical competence of young volleyball players.

Conclusion

The analysis of the research and methodology literature has shown that the current principal methods of training in volleyball are traditional methods of training in physical movements based on the memorization of physical movements in the clearly regulated context. These methods do not sufficiently deploy the meaningful activity of athletes in the training process and, therefore, do not allow to implement the existing discrepancies between the variative criteria of the game and overlearning of the typical physical skills under standard conditions during training.

It has been found that there is insufficient research into the development of the procedural guidelines for the training process at the youth sports school in volleyball (especially at the initial stage of training) using the activity theory in education whose main provisions allow to organize a general-to-specific training with the development of knowledge, skills and abilities in terms of addressing generalized training tasks. These approaches allow to successfully resolve the discrepancies in the formation of flexible physical qualities that meet the requirements of team sports.

A number of unique characteristics in volleyball have been identified that do not have counterparts, as well as many physical movements that are also unique in sport and that require special attention during training.

The methodology of training in physical movements in volleyball has been developed and substantiated, with its most important components being:

- The formation of interest in mastering the techniques of basic physical movements in volleyball and acquiring of theoretical knowledge;
- The solution of the common training task - volleyball game, which allows trainees to identify the most important practical components of the technique elements in volleyball that are being studied, and their integration into the overall game;
- The simulation using a dedicated training model involving generalized and game-related physical movements with the search for previously unused methods of solving the tasks at hand.

The effectiveness of the developed methodology has been proven, and the analysis of the results of the pedagogical experiment has shown a statistically significant ($p < 0.05$) dynamics of the experimental test parameters. This methodology of training in physical movements is notable for its effectiveness in the formation of motives and interest that is transferred from the result to the method of achieving it. The pedagogical process that is organized based on the activity theory in education deepens and expands the knowledge of the essence of the technique elements in volleyball and enhances the ability to manage own movements.

Conflict of interests. The authors declare that there is no conflict of interest.

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