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Experiment on Minivolleyball Training Optimization Through Technique- Correcting Systems

Carmen PÂRVU¹

Abstract

The present research deals with the importance of using correcting systems in sports training, also tackling some regulations that are sometimes inconsistent with the real potential of the players, or the game requirements for the next level.

The paper evinces by means of an experiment the need to introduce 4 corrective systems for optimising the technique used in minivolleyball groups. The regulations on the obligatory 3 hits in the team's own court raise many training problems both for coaches and young players who, in addition to consolidating technical elements and procedures, also have to work on accuracy as early as the minivolleyball level. The systems used are mechanical, easy to manufacture, are relatively inexpensive, but prove to be very helpful in the young players' motor learning according to today's requirements in this sporting field. The idea of conceiving such mechanical systems started from the study of the commonest technical mistakes found in practice. The subjects under study are athletes registered at the Arcada Sports Club Galați, where I work as a coach, who are boys between 7-10 years of age, and improved their executions by means of these technique-correcting systems during the training sessions. The results obtained in the final test allow us to believe that the use of these corrective systems in training may prepare the young players more effectively, making them more capable of facing the new regulations.

Keywords: *Acquisition, correction, optimization acquisition, volleyball, corrective systems*

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1. Introduction

According to the dictionary, optimization means the activity of selecting, out of the set of possible solutions to a problem, the solution that is the best according to a predefined criterion [6] or in other words, in our field technique optimization should compel the teaching staff to adapt to new requirements until new efficient training solutions can be found [1] thus shortening the time devoted to learning and eliminating, as much as possible, technical errors. Technique optimization in volleyball is a decisive step towards high performance, and that is why the training methods and means should be reoriented, so that to lead towards execution accuracy and consistency, as early as the primary stage of learning the technical element [3].

2. Problem Statement

All books describing the methodology of teaching volleyball contain entire chapters of specific exercises, all focused on one or several players and a ball. Although the online media abounds in patented learning and correction devices, the authors of specialized literature do not attempt a different approach of the teaching methodology using more modern devices or systems of training. After each element or technical procedure described in specialized literature one may always find the description of the technical errors that may occur in its execution, but not the potential corrective methods. Upon analyzing all technical devices and systems used worldwide in training volleyball players, the present paper aims at highlighting the usefulness of corrective devices for the technical training of players aged 7-10. In the context of the new regulations of the minivolleyball game, our main purpose should be to find methods to correct technical mistakes by means of devices and systems made up and conceived by the coaches themselves, able to facilitate learning by eliminating errors [4].

3. Research Questions/Aims of the research

If the regulations which require the three hits and playing the ball only towards zone 2 (at first) impose consistency and accuracy of execution, can one find exercise sets using corrective devices that would decrease the number of technical errors made by the young volleyball players?

The theoretical objective is to inform coaches and trainers, as well as teachers in the field about optimizing technical training by implementing technique-correcting devices in the training sessions.

The applicative objective is to present technique-correcting devices specific to volleyball acquisition that can be used in training children aged 7-10 years old, and to evince the progress made when these are used.

Purpose of the Study

The purpose of research is to optimize technique by introducing corrective systems in the minivolleyball teams.

4. Research Methods

The revision of specialized literature was aimed at completing the knowledge on the methodology of volleyball training, as well as adapting new methodology from other fields of study such as mechanics and computer science. We made an inventory of all the technological training devices and systems in volleyball, extracting only the information that referred to the age peculiarities of the children who are the subjects of this research. Out of the many technological devices, software and systems used in volleyball training and assessment, our attention went towards 4 systems which we called technique-corrective systems on the basis of the manufacturer's description. Their production was achieved with our own financial resources, being followed by their implementation in the training sessions.

The observation method consists in evincing the behavior of the 16 subjects and their manner of manifestation, as well as how they respond to new stimuli, viz. the new training sessions containing the exercises of technique correction.

The video analysis method was used to highlight technical mistakes for the procedure called two-handed downward step and two-handed upward step. The film was divided into frames in order to show which segment is responsible for the faulty execution, and whether the mistake occurs before the contact with the ball (wrong position or defective displacement) or during the contact with the ball.

By means of the **experimental method** that lasted for 6 months, during which the players had 4 training sessions per week, we implemented the systems we devised into exercise sets in the experimental group, while the witness group had a normal training schedule.

The results of the subjects (the witness group - the experimental group) obtained in the initial and final testing were analyzed by means of **the**

statistical-mathematical method calculating the efficiency indices, and the most relevant were represented by **the graphic method**.

5. Findings

To perform the experiment we chose two groups of volleyball players from the Arcada Sports Club in Galați who had 4 training sessions per week consisting of 120 minutes each, in normal conditions of training, material and specialized devices. Four technical tests were applied in the two testings, and the number of technical errors was calculated out of 10 executions for each test and each player.

The video analysis allowed for the careful observation of the arm work when they execute the up and down takeover towards zone 2, highlighting the fact that due to the considerable distance between the player in zone 3 and the player in zone 2, it usually happens that the arms are raised too high in downward takeover and thus the ball goes over the net from the first hit, which is a foul and the opponents score the point.

The videos were processed by means of a specialized program whose software is available at <http://www.physicstoolkit.com/> [5], making it possible to see all the important sequences during the play.

Figure 1. Graphic representation of technical error identification by video analysis

The program calculates the angles of the body segments during the execution of a technical procedure, and it can be played forwards and backwards, which allows the viewer to count the number of mistakes made by a player who is or not in contact with the ball [2].

The video analysis of the 16 volleyball players revealed that in the witness as well as in the experimental group the arm work (bent elbows and fist above shoulder level) during the contact with the ball during the execution is the commonest mistake at this training level.

In order to correct these technical errors and increase the efficiency of the play actions corrective systems were created and implemented in training. The four systems were conceived according to the models on the internet, made of cost-effective materials and not hindering athletes during execution.

Here are the systems we used in the training session with the young volleyball players:

Table 1. Corrective systems for the upward and downward step with two hands [7]

<p>Name: Corrective system –fist level in relation to the shoulder</p> <p>Objective: correcting hand raising above shoulder level</p> <p>Description: it is attached to the wrists and ankles preventing or correcting raising the fist above shoulder level. The elastic band is adjustable so that to fit any player, and the 4 cuffs are fitted with glue that can be adjusted according to the limb where it is attached .</p>
<p>Name: Corrective system – forearm contact and finger contact</p> <p>Objective: correcting faulty contact with the ball in the upward and downward step, service initiation, and attack hit</p> <p>Description: it is a useful system, allowing the execution of a high number of repetitions without the help of another individual. It is made up of a belt around the waist, a neoprene case containing the volleyball, and an elastic rope. The elastic rope allows the ball to come back to the player each time after execution. It is used for: control upward step with two hands, control downward step with two hands, initiation in the upward and downward service, and attack hit.</p>
<p>Name: Corrective system for bent elbows execution</p> <p>Objective: correcting bent elbow execution in the two-handed step from below</p> <p>Description: the system consists of a belt attached at the waist and two elastic bands fitted with cuffs. The length of the elastic bands is proportional to the height of the player,</p>

the length of his upper limbs, so that during the execution the elastic band should be stretched, thus correcting elbow bending when touching the ball.

Although the subjects had 4 technico-tactical tests (upward step towards zone 2, takeover with upward step and passing to zone 2, two-handed downward step, and two-handed takeover from below and passing to zone2), the number of faulty executions were not detailed for each test, but taken as a whole.

Table 2. Results of faulty executions in the two testings for the experimental and the witness group

Group	Statistical indicators	Unsuccessful executions in the 4 tests	
		Initial test	Final test
Experimental Group	X	59.42	27,17
	SD	7.90	4,24
	CV	13.30	15,60
	Average diff.		32.25
	t		12.46
	p		<0.001
Witness group	X	60.92	49,83
	SD	6.24	6,22
	CV	10.25	12,48
	Average diff.		11.09
	t		4.36
	p		<0.001

Note: X – arithmetical mean, SED – standard error deviation, SD – standard deviation, CV – coefficient of variation; t – Parametric Test Paired Comparison for Means; TI – initial testing, TF – final testing.

The table analysis reveals that the result of the variability coefficient is under 20% in the two tests, which means that both groups are homogeneous (average) in point of this parameter. By applying the Student test for the average of the initial and final testings we obtained $p < 0.001$ which means that there are significant differences between the means of the two tests in relation to the parameter under study (decreasing the number of

errors). These results confirm the usefulness of implementing technique-correcting systems in the training lessons, which increase the acquisition efficiency by reducing the number of mistakes.

Figure 2. Number of mistakes and the evolution of the two groups

The comparative analysis of the two tests in the experimental group shows the result of the action of the independent variable, leading to a significant average dissimilarity. The witness group had an average of 60.92 errors in the initial test, with a little progress in the final test reaching the average of 49.83. The experimental group registered a significant difference, reaching 59.42 errors in the initial testing, and 27.17 in the final testing.

6. Conclusions

The analysis of the statistico-mathematical indicators regarding the specific tests for young volleyball players showed that the witness group made considerable progress in the two technico-tactical tests, while in the experimental group all the 4 tests were significant, which is proof that the systems may contribute to acquiring better execution technique in a relatively short time, decreasing the number of technical errors, as these are usually the reason for losing points in minivolleyball.

The progress made by the experimental group confirms the fact that the new working method involving the implementation of these corrective systems used in the step from above and from below is efficient in the training of young volleyball players.

There are many patented devices useful for training volleyball players that are available on the internet, but the teachers' and coaches' interest

should be raised by publishing new informative materials containing acquisition techniques that could be implemented. By means of these modern devices, athletes have a clearer motor representation, and thus manage to have better accuracy and consistency indices, making training sessions more attractive.

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