Practical experiences in using the simulation method of learning the sportive technique in swimming

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Abstract

The work puts forward the concrete ways of using the simulation method in the performance sport. By means of an experimental research, it is enabled the theory according to which the usage of the complementary trainings of neuromuscular control on the Ergosim conditions simulator determines the improvement of the athletic technique, because of the effects of this method on the sportive learning technique. The applied relevance of the research results from the proposed training methodology in what concerns the usage of the simulation method in training the swimmers, in order to enhance their technical efficiency.

Keywords: simulation; performance; sport;

1. Introduction

The technique contains the sum of all the impellent actions ideally made from the point of view of their efficiency, with a minimum waste of energy, through which the athlete executes a sports task. (Dragnea A. and Teodorescu M. S., 2002, p.281, Bompa, T.O., p.52). As is the case of other sports, in swimming too, the technique is considered being the basic factor which determines the achievement of the performance' objective (Bompa T. O., 2002, pp.52, Cirla. L., 1999, pp. 164). As closer the athlete gets to the technique’s perfection, as less energy he consumes to have a good result.

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The importance of the reversed connection, as a link of this process, led to its consideration as a functional constitutional element of the analyzers. For this, Golu M. and Dicu A. (quoted by Cirla. L., 1999, pp. 27) define these systems as: "morphological and functional units of the receiver, of the leading ways, of the central nervous system and of the reversed connection."

2. Content, methodology

Our research is based upon the following premises:

The simulator training facilitates: a climate as close as possible as the one in which the real action takes place; the study and the explanation of the complex actions; the observation of the composing elements and their functionality; the operations’ execution; correctly learning the technical habits; checking/evaluation the impellent behavior; the variety of the performance situations in order to find instant and appropriate solutions; movements self-control; offers real time information, both to the athletes as to the coaches; athletes’ self-evaluation/awareness.

The Ergosim simulator can be used not only for the rise of the finesses state of the impellent representations, but it can be used at practicing and improving the impellent memory by a temporary supply of some passing deficiencies and by the possibilities offered to return to an information which resembles more and more, from the quality perspective to that properceptive." (Hillerin P.J., 1996, p. 129)

We have taken into consideration that using the simulator in Ergosim conditions as means and method of training influences in a good way the learning of the specific swimming technique. Training customization of neuromuscular control on the conditions simulator increases the solid learning of the technique and forecloses the frequent mistakes.

The purpose of the research is to realize a training methodology regarding the usage of the simulation method, on the Ergosim condition simulator for the swimmers' training, for increasing their technical working capacity.

During the research there have been accomplished two types of tests. In the first category, we can situate the crawl swimming test on the 25m distance; the covered distance has been clocked and there has been counted the number of arms. This happened on the 18th of January 2014 and had the purpose to identify the necessary reference data to establish the force level and the arm pull length, individual crawl for the research subjects. The second category of tests covered the contest trials and results during the Swimming National Championship, between December 2013, April 2014 and June 2014.

The alleged experiment took place between the 27th of January 2014 and the 9th of June 2014, on a group of 7 swimmers from Viitorul Pitesti Sports High school. The specific water preparation/training took place in the Pitesti Olympic Swimming Pool, and the Ergosim trainings took place at the Pitesti FEFS Research Center.

During the training on the Ergosim simulator it has been pursued the correction of the following mistakes which appear during the crawl procedure and which influence the sports performance: the palm’s position on water, the attack (catching the water), the movement control during the arm pull-up length, a longer pull-up length, the arm’s rebound over the water with a high elbow and the palm beside the body, the head position must not be with the chin close to the chest, the body position must be without hip movements. The athlete was asked to follow the model on the screen:
- the palm's departure in movement to be realized from the force's vertical articulation, according to the shown model;
- to respect the model, the lines to be as grouped as possible;
- the movement trajectory has to be as long as possible;
- the arm's returning to be realized with a high elbow and with the palm along the body.

To establish the training schedule, there have been worked out the training global program and the learning unity for the crawl procedure.

The present research/ study is a longitudinal one, realized as a case study, which assures the understanding of a superior level of understanding the researched phenomena.

Because of the biological and physiological parameters’ evolution has some mostly individual characteristics, there have been realized individual training programs.

In this way, the obtained results are presented under the form of a case study, which show the best the effects and causes of the researched phenomena.

Case study - M.R.
M.R. (2002) participates at his age category – children - in the 100m crawl trial. To establish the training program, it has been made the first tests’ category which took place on the 18th of January 2014, and had the purpose to identify the necessary reference data to establish the force level and the arm pull length necessary to the alleged experiment. It has been given the time of the covered distance and the number of the arms made. 

This way, the training program parameters with which it has been worked are presented in the following chart:

Table 1. The pull up force characteristics and its length

<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Force level (N)</th>
<th>The pull-up length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.R</td>
<td>7</td>
<td>1.20</td>
</tr>
</tbody>
</table>

Table 2. Global training program used in the educational experiment
<table>
<thead>
<tr>
<th>Objective (O)</th>
<th>Resource contents</th>
<th>Learning capacity</th>
<th>Educational scenario</th>
<th>Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>O1</td>
<td>The 25m crawl swimming float. The time is kept and the executed arms are counted.</td>
<td>The basic elements’ quality of the rules that must be respected</td>
<td>Physical exercise</td>
<td>Floats</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Psycho-impellent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>O2</td>
<td>The development of the neuromuscular control, trying to adjust the arms’ action</td>
<td>The basic elements’ quality of the rules that must be respected during the execution</td>
<td>Simulation method</td>
<td>The Simulator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Psycho-impellent Intelective</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- 4 series of 10 repetitions for each arm, with the same force level (cc. 60-70%)</td>
</tr>
<tr>
<td>O3</td>
<td>The neuromuscular control of force – crawl sliding – without model</td>
<td>The basic elements’ quality of the rules that must be respected during the execution</td>
<td>The physical exercise using the simulation method</td>
<td>The Simulator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Psycho-impellent Intelective</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- 5 series of 30 m;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- 5 series of 15 repetitions for each arm, with the same force level, emphasizing the neuromuscular control. The athlete can intervene both upon the pull-up movement and also upon the release (the end of the pull-up)</td>
</tr>
<tr>
<td>O4</td>
<td>The neuromuscular control of force – crawl sliding – with model</td>
<td>The basic elements’ quality of the rules that must be respected during the execution</td>
<td>The physical exercise using the simulation method</td>
<td>The Simulator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Psycho-impellent Intelective</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- 5 series of 15 repetitions for each arm, with the same force level, emphasizing on the pull-up end. The athlete can intervene also upon the pull-up movement from the moment of the attack.</td>
</tr>
<tr>
<td>O5</td>
<td>The neuromuscular control of force with model with levels – crawl sliding</td>
<td>The basic elements’ quality of the rules that must be respected during the execution</td>
<td>The physical exercise using the simulation method</td>
<td>The Simulator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Psycho-impellent Intelective</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- 5 series of 15 repetitions for each arm, with the same force level, emphasizing on the end of the pull-up. The athlete can intervene also upon the pull-up movement from the moment of the attack.</td>
</tr>
<tr>
<td>O6</td>
<td>The neuromuscular control of force with model – crawl procedure</td>
<td>The basic elements’ quality of the rules that must be respected during the execution</td>
<td>The physical exercise using the simulation method</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Psycho-impellent Intelective</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The technique evolution - the athlete M.R.

As can be seen in the fig. 2.1., during the first training on the simulator, the arms’ movements are completely uncontrolled, in what matters the neuromuscular control on a specific sliding crawl movement, not being kept on the pull-up length, the elbows’ position in the rebound stage is low. The arms’ pull-up length is from 1.05cc-1.20 on the horizontal axis, and on the axis force, the movement is realized from 1.5 - 5 cc.

This arms’ movement has relevant times from the primary test, where the 100m crawl trial’ time is 1.18.71, time registered in December 2013, at Bacau National Championship.

In fig. 2.2., the execution model determines from the first training a correction concerning the muscular control, but not enough to realize an efficient and correct movement of the crawl sliding movement. On the horizontal axis, the movement is taken place between 1.10 and 1.35 cc., and on the vertical axis is between 1.5 – 7. The athlete has been asked to respect the chart/ table shown on the screen, the palm to execute a faster movement in departure, the palm’s articulation to remain fixed, and the water release to be realized faster, the arm’s return in the aerial stage to be made with the palm beside the body and with a high elbow.

After the 5 trainings, there can be noticed in fig. 2.3., that the movement is more controlled with both arms, the pull-up length is between 1.20 – 1.35 cc with both arms on the horizontal axis, and on the vertical axis it is situated between 1 and 5 cc.

In this period, there also takes place the intermediary test, where the performance is improved, and the time is 1.12.40 in the 100m crawl.
When introducing the crawl arms’ movement, it can be noticed in fig. 2.4., how the movement becomes uncontrolled again, even if there is also the model. Because of the continuous arms’ movement, the athlete finds it difficult to correct and maintain the movement surface. The horizontal axis movement is situated between 1.20-1.35 cc, and on the vertical axis is between 1.20 and 5 cc.

After 10 trainings (fig. 2.5.), the movement gets neuromuscular controlled, the pull-up length increases, the attack being made in a higher position on the axis, and the technique improvement becoming clear in comparison with the first simulator training.

At the end of the training period, it has been done the final test at the National Championship, where in the 100m crawl trial, the time was 1.11.13.

From the moment of the primary test, until the final test, it has been made a 7, 48 seconds improvement in the 100 m crawl.
Conclusions

1. The sport training is a complex process which always targets reaching sport performances, in which the technical training is one of the modern sport training components which lends to be reconsidered by using the simulation method, for the purpose of improving the perceptive impellent learning.

2. The results of the experimental research underline the fact that, by introducing individual trainings on the conditions simulator used in the performance swimmers’ training, determined the efficiency of the swimming technique, and also of the performance in economical time and energy conditions. The individual conditions are obvious in all the experiment subjects. The athlete P.B. realized the most efficient technique improvement, by succeeding to improve the arms’ movement trajectory length, from 1.05m (in the beginning of the experiment) to 1.40m (at the end of the research).

3. Although the application period of the global program was relatively short, of 15 weeks and of the competitions different condition of developing (indoor pool / outdoor pool), 71,42 % improved their trial performance. We mention that test I and test II took place in an indoor pool, and test III took place in an outdoor pool, where the importance of the environment agents, in order to establish the competitional performance, is well-known.

4. The results of the educational experiment of performance swimmers from Viitorul Pitesti High School, is gathered in a good practical experience that can lead to the development of a methodology of using this method of training, during a year of training, obviously connected with the specific water training, with the methods and means used for all the training agents of this sport discipline.

5. The global training project content, the working project content, the projection of the learning units used in the experiment, the scientifical observation protocol model, can be working instruments in an extended research at the level of all the swimming techniques, for all the training levels, but especially for the first forming levels, where the technical customs are apprehended and enhanced.

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