

THE MAIN TRENDS IN THE IMPROVEMENTS OF TRAINING DEVICES

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The aim of this presentation is to review the main trends in the improvements of the training devices which are commonly used to drill motor actions and to develop certain physical qualities and abilities.

The first way is to invent the training device which guarantees proper performance of the athletic movements. These are the devices which help to perform different previously programmed movements, restrict irrational trajectories and irrational body positions, provide physical assistance, etc.

The most beneficial manner is the construction of devices which imitate the changes in the position of an athlete and particularly the changes in the joint movements.

The implementation of the devices which control joint movements permits the planning of physical exercises based on completely new methodological positions, which suppose a number of entirely new approaches to the process as a whole and allow to distinguish a row of stages such as a stage of sensor-perceptive training, the formation of performative abilities to athletic action stimulated by the device. In particular and rather encouragingly seems to be the combination of the training devices, controlling joint movements, with the devices that change such physical features as elasticity, mobility, vibrational properties of the medium, gravitational parameters of the athlete's body and activate reflexogenous points of the body, mechanically acting on the skin.

The devices which control the changes of the pose are easily combined with audio devices that also stimulate different actions of an athlete. A special effect should be expected from certain combinations of the types of the devices that stress by means of tape-recorders the importance of certain movements and poses and help to fix and change certain points essential for the performance, depending on its speed [slow, normal, fast].

The stimulation of the actual movement of an athlete in the imperative training device can be done with the help of electrical impulses, acting on his muscles. This approach is very efficient when it is used for fitness exercises. The second way is the improvement of the means of fixed objective information on the different movement features including mistakes. These means allow one to provide a feedback for the exercises aimed at the training of certain physical abilities, by offering an athlete a certain succession of patterns which carry information on his actions and give him a choice to compare them within the programmed actions.

Of all the sets of the fixed technical devices the most encouraging are the ones which inform on the main objectives of motor activities - the controlling movements of joints. To form the effective muscle movements it is necessary to obtain the proper information on kinematic features of joint movements (their amplitudes, speed, acceleration), combined with the information on the action of separate muscle groups, that provide different joint actions. To obtain data on these actions one can use methods as electromyography, electroacoustics, etc.

Equally important are the training devices intended to provide information on the integral parameters of movements - the forces that represent the bearing action, especially if they are combined with video devices. To develop physical abilities it is necessary to use the devices carrying information on psycho-physical reactions that take place in an athlete's organism (for example, autocardioleaders, etc.)

The training devices of the second type are the most effective in the process of producing the simple motor actions. When planning complex athletic motor exercises (primarily at the initial stages) it is desirable to combine the mentioned training devices with the devices of the first type.

So the third way of investigation is the creation of a compound training stand which comprise the devices that effect an athlete not just energetically or physically but also provide an optimal circulation of information both by feedback channels and by causation. The objective information is available from the inner contour (i.e. from the device to the athlete) and from the outer contour of the information channel, which passes the training device to the training device itself aiming at its adaptation to the reactions of the athletes and also promotes the implementation of all kinds of automatic training devices, which are in fact the fourth perspective trend closely connected with computer technique. No doubt, the implementation of the fourth type of the devices is just a perspective trend although such devices have already been practiced.

Speaking on the perspectives of the implementation of different kinds of devices it is necessary to mention their functional structure, to find their ingredients and to define the most important requirements of their construction.

A modern training device aimed at the formation of athletic exercises must comprise of at least one of the following units: a unit of energy and force, plus those of optimal information and feedback.

To match automatic training devices, adaptable to an athlete's actions, the construction is completed with a unit of comparison and control.

All these trends in the development of the training devices are closely connected with the attempts to improve their functional components. Following this idea, the first type is connected with the improvement of energy-force unit and the optimisation of the coupling connections, while the second one is interrelated with the development of feedback; the third - with the unification of the first two units, and the fourth - with the implementation of automatic adaptive devices for comparison and control into the program.

One of the specific features of the functional structure of the training device is a specific interaction of the units providing energy and functional optimisation for the coupling connections. In many cases these functions are provided by one device which comprise both energy supply of the action and its consumption by an athlete.

To summarize the general requirements of the modern training devices, it is important to mention the ones that must be met. It is compulsory to increase the efficiency of the artificially implemented exercises, so that they can result in the raise of the quality of skills and in their safety.

The second requirement of the training device is the creation of certain artificial conditions which can secure a lot of exercises with a minimum of mistakes, and ideally - without mistakes.

One of the most important requirements is that such artificial conditions of athletic performance are set in a manner that excludes any kind of deformation to its orientational base or kinaesthetic sensations.

Besides that the construction projects must envisage the possibilities of a number of options in the artificially created conditions of movements which provide a gradual involvement of an athlete to the whole range of exercises - from the simplest to the natural ones.

They also must take into account the common didactic principles (consciousness, activeness, clearness, simplicity, etc.).

To make these educational requirements a reality, a training device must provide: 1) a full information on the logical, biomechanical and psychological structures of the exercise; 2) the compensation of the missing components of psychic, physical, coordinational and semantic abilities of an athlete; 3) a sufficient information on the character and the quality of his athletic activity (including the estimate on his psychophysiological tensity).

Summing up the review of the perspectives of the development of training devices and the requirements to their technical characteristics, it is important to stress that the modern level of research and technology allows one to construct any type of the devices mentioned above and to satisfy any of the above mentioned requirements. This process is being slowed down only by certain economic processes.