Automated system for collection and differentiated evaluation of functional and special physical fitness of swimmers of different level of qualifications

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Abstract

Objective of the study was to justify and develop an automated system for collecting and differentiated assessment of functional and special physical fitness of swimmers of different skill levels.

Methods and structure of the study. An automated system for collecting and dif-ferentiated assessment of swimmers preparedness (ASSOPP) has been developed. The central link in the functioning of this system is the methodology for differentiated assess-ment of the functional and special physical fitness of swimmers at different stages of long-term training.

Results and conclusions. The structure of an automated system consists of a «manual processes» component and an «automatic processes» component. The «manual processes» component combines the process of differentiated diagnostics of swimmers level of readiness and the process of data entry. The «automated processes» component combines a number of procedural actions carried out using specialized computer software: normalization of all entered indicators (reduction to a single scale), differentiated assessment of each entered indicator, calculation of an integrative (average) assessment of the entire set of entered indicators, ranking and comparison of assessments of individual indicators, ranking and comparison of integrative assessments, visualization of assessments of all modalities, collection and archiving of information in a data bank, issuance of information to users. It is noted that the automated system for collecting and differentiated assessment of swimmers preparedness allows, in remote access mode, to collect and differentiated assessment of the functional and special physical preparedness of swimmers of different skill levels.

Keywords: *automated system, differentiated assessment, swimmers, special physical preparedness, functional preparedness.*

Introduction. At the present stage of development, sports, including competitive swimming, are distinguished by a high level of intensification of training and competitive activity and a steady increase in sports performance [1, 5]. It is noted that record achieve-ments in competitive swimming are demonstrated by athletes who have a unique set of morphofunctional and mental abilities [1, 5]. In this regard, the search for effective ways and methods of high-quality selection of talented athletes and their further accompaniment during many years of training is especially urgent.

The solution to this problem can be successfully accomplished with the help of constant monitoring of the level of special physical and functional readiness of a wide range of athletes at all stages of the development of sports skills [1, 2, 12]. The use of monitoring as diagnostic tools in the system of long-term training of swimmers allows one to objectively assess the level of functional and special physical fitness of athletes and, on this basis, effectively manage the training process [1]. At the same time, diagnostics and assessment of all aspects of athletes' preparedness should be built using modern informative methods and automated technologies based on specialized software [12]. However, at present in Russian swimming there is no comprehensive automated system for dynamic

monitoring of the level and dynamics of swimmers' preparedness, and the manual method of diagnosing and assessing the data obtained significantly reduces the possibility of analyzing information.

At the same time, dynamic monitoring of swimmers' preparedness can now be im-plemented with the help of modern information and communication technologies [3].

Thus, it seems extremely relevant to develop and implement information systems for monitoring the condition and readiness of athletes of all qualification levels.

Objective of the study was to justify and develop an automated system for collecting and differentiated assessment of functional and special physical fitness of swimmers of different skill levels.

Methods and structure of the study. Currently, digital transformation of all as-pects of physical education and sports activities is being carried out. New approaches to diagnosing and assessing the preparedness of those involved in physical culture and sports are being developed. For example, a number of automated systems for dynamic monitoring of the state and physical fitness of the body have been implemented in a number of areas of physical education and sports training, which have shown their effectiveness [6, 7, 10, 11, 12].

An automated system for collecting and differentiated assessment of swimmers' preparedness (ASSOPP) was studied. The central link in the functioning of this system is the method of differentiated assessment of the functional and special physical fitness of swimmers at different stages of long-term training, developed and described by us earlier [8, 9].

Results of the study and discussion. ASSOPP consists of a «manual processes» component and an «automatic processes» component.

The «manual processes» component combines the process of differentiated diagnostics of the level of functional and special physical fitness of swimmers using a developed set of tests and samples. The key component of the diagnostic complex is swimming tests assessing various aspects of energy supply to muscle activity, developed on the basis of the results of our own research and data from literature sources [1, 4, 13].

The athlete data entry process ensures the creation of «passport» data and the results of all tests. In this case, the information is entered through remote access of an authorized user to the personal account of the online service located on a special website.

The «automated processes» component combines a number of procedural actions carried out using specialized computer software.

After entering data on the test results, the functionality of the computer program se-quentially and automatically carries out the following processes:

- normalization of all input indicators (all test results of different sizes and different modalities are brought to a single scale);

- assessment of each indicator, differentiated depending on the individual typologi-cal characteristics of the swimmer, the main method of swimming, distance specialization and skill level on a special scale, taking into account the ranking (weight) coefficient re-flecting the significance of a specific indicator for ensuring special physical performance (sports result) at a certain level of preparedness;

- calculation of the integrative (average) assessment of the entire set of entered indi-cators;

- ranking and comparison of estimates of individual indicators in a series of dynamic repeated measurements and in comparison with the indicators of other examined athletes;

- ranking and comparison of integrative assessments of each examined athlete both in the dynamics of successive measurements and in comparison with other examined ath-letes;

- visualization of assessments of all modalities (assessments of individual indicators, integrative assessments, dynamics of assessments in repeated measurements, etc.). At the same time, it is possible to receive assessment information both in digital and analog (graphic) form;

- collection and archiving of information in a data bank located on a special server;

- delivery of information to users, as well as data entry, is carried out through re-mote access via the Internet. In this case, both the entire volume of information and only part of it may be available, depending on the user's status.

Conclusions. Thus, the well-founded and developed ASSOPP allows, in remote access mode, to collect and differentiate in an automatic mode the functional and special physical fitness of swimmers of different skill levels. Based on the assessment of testing data and their ranking, it is possible to more effectively carry out selection and sports se-lection in children's and youth swimming, form ratings of swim-

mers, and form national teams of all levels. In addition, a comprehensive assessment of the various components of the functional and special physical fitness of swimmers will make it possible to quickly, if necessary, adjust training influences and optimize training management. For the practical implementation of the functionality of the proposed automated system, it is necessary to resolve a number of issues of an administrative and managerial nature, staffing, and information security. ASSOPP should act as a distributed system at the federal or departmental level with regional segments.

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