

INFORMATION SUPPORT FOR THE TRAINING PROCESS OF YOUNG SWIMMERS BY MEANS OF DEVELOPING MOBILE APPLICATIONS

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Purpose: substantiation of the need to develop a mobile application to control training loads in the preparation of young swimmers.

Material and Methods: theoretical analysis and synthesis of references; methods of information modeling & programming, questionnaire, methods of mathematical statistics.

Results: «SwimmDiary» mobile application on the Android Studio and Java platforms was developed; the development is aimed at individualizing control and planning of physical activity in young swimmers. The development allows you to create and adjust a personal profile of an athlete, register individual indicators, establish a daily training program in the calendar, view existing standards and compare your own results with them, statistics of physical activities performed for a specific training period. The program includes such indicators as: the name of the physical exercises, the time of their completion, the mileage of the preparatory exercises to cover the main distance. The mobile application contains the following swimming styles: butterfly stroke, brass, crawl on the back, freestyle and integrated

swimming style. A questionnaire was conducted, the main purpose of which was to identify the respondents' attitude to the mobile application. It was found that young athletes liked the development the most ($11,2\pm 0,07$), and their parents gave the lowest marks ($8,3\pm 0,08$) on a 12-point scale.

Conclusions: it was found that the use of modern information technologies in the educational process of young swimmers is possible using mobile applications, survey of respondents found a high level of attitude towards the development of young swimmers, coaches and swimming scientists. The survey revealed a high level of evaluation of respondents of the mobile application SwimmDiary (48%) and indicated the strongest components of the program (design solution and presentation of the mobile application) and weak (data visualization).

Keywords: young swimmers, training, mobile applications, programming, information technology.

Introduction

The use of information technology in the field of training students, qualified and young athletes, according to A. Azhippo and T. Dorofeeva, is the need to develop a balanced system of pedagogical control and management. Particular attention should be paid to the process of training young athletes, requiring high attention from trainers, doctors, psychologists, scientists. The training system for young swimmers, as noted by V. Platonov, requires a search for new directions for improving the system of sports training, dictates the need for the full use of hidden reserves that are inherent in the personality of the athlete. These opportunities can be opened using modern information systems for planning and accounting training loads.

In swimming, the problem of the scientific justification of fundamentally new directions of development and further improvement of the training process was quite clearly outlined, since the possibilities of the currently existing training methods have almost exhausted themselves. That is why A. Pilipko, V. Politko, A. Poproshaev and

other specialists pay more and more attention to the communication of quantitative and qualitative characteristics of training in swimming.

A. Rovny, A. Tsos, Mandzák, P., Mandzáková, M., Pavlíková, R. and other authors point out that the attention of trainers and scientists is aimed at studying, comparing and selecting the most effective training tools and methods that represent increased requirements for the functional systems of the body, the capabilities of which determine the success of competitive activity.

The intensity of life of a modern young man, the glut of information is so high that, according to V. Ashanin, L. Filenko, G. Poltoratskaya, requires the attraction of additional energy resources of the body. These resources should be systematically replenished and restored to maintain health. According to Piercy, K.L., Troiano, R.P., Ballard, R.M., Carlson, S.A., Fulton, J.E., Galuska, D.A. and other authors, information technologies allow optimizing the interaction between the trainer and the sports doctor, systematically regulating the level of physical development of children and their health. Studies by Zhou, M., Fukuoka, Y., Mintz, Y., Goldberg, K., Kaminsky, P., Flowers, E., & Oi, A. indicate that owing to computer programs the coach has a variety of information about the condition of children who came to classes: who of them was recently ill and what, who has chronic diseases, undergone surgery or injury, contraindications to classes. This information, promptly provided to the trainer before the start of the training, allows him to plan individually physical activity for each child, select sets of exercises, combinations of technical elements and the like.

Especially relevant for the training of modern athletes, according to V. Pasko, A. Rovnyi, Chang, Y.K., Etnier, J.L., Wiemeyer, J. and other scientists, the use of mobile applications for the operational management of training. In the studies of V. Golokha, V. Romanenko, L. Podrigailo, S. Ermakova, Jennifer L. Etnier, Yu-Kai Chang, Ho, CL, Fu, YC, Lin, MC, Chan, SC, Hwang, B., & Jan, SL and other authors present the development of mobile diaries for trainers and athletes, programs for obtaining individual indicators of athletes and analysis of training results. The authors provide a detailed justification of the appropriateness of using modern information

technologies in the training process and bring their direct impact on the functional capabilities of the body of athletes.

The rationale for the use of information technologies in the field of physical culture and sports is presented in the fundamental scientific topic “Scientific and methodological foundations of the use of information technologies in the formation of professional competence of specialists in physical education and sports”, within the framework of which the study is presented.

Purpose of the study: is to justify the development and application of a mobile application to control training loads in the preparation of young swimmers.

Material and methods of research

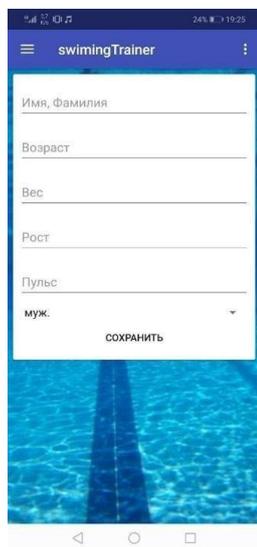
The study was conducted on the basis of the Kharkov State Academy of Physical Culture and the Kharkov gymnasium No. 172. The study involved 124 respondents, including 82 young swimmers 10-14 years old (50 boys and 32 girls), 8 swimming coaches, 8 specialist swimming scientists, 26 parents of young athletes. The following methods were used: theoretical analysis and generalization of literary sources; pedagogical observation (processing of educational and methodical literature, attending training sessions for young swimmers) methods of information modeling and programming (development of a mobile application algorithm, creating a program), questioning, methods of mathematical statistics.

Results of the research

In the presented study, the SwimmDiary mobile application was developed for fixing the main indicators of a training session and controlling physical activity in swimming. When working with a mobile application, the user should register and enter personal data (Figure 1a): last name, first name, age, body weight, body length, resting heart rate, gender. When registering the primary data of young athletes, their personal profiles are created, access to which are available to the athletes themselves, their trainer and system administrator. At the request of the user, it is possible to add other entries to the registration window. All user profiles are recorded and stored in a single database on the application developers server. Also, the personal profiles of

young swimmers can be copied to a local mobile device, because they do not occupy a large amount of memory - approximately 10 MB.

An application was developed when registering personal data that allows you to insert graphical information (athlete's photo, diagrams, drawings, videos), but such profiles require significantly more memory.



a) registration window



b) list of "Menu" functions of the program

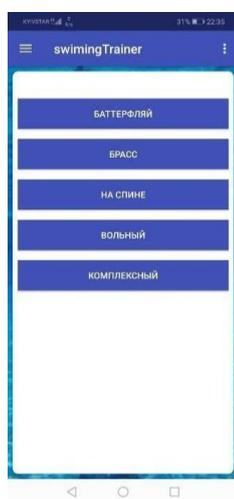
Fig. 1. Registration window and “Menu” of functions of the mobile application of the "SwimmDiary" application

To manage the mobile application, you should use the “Menu” (Fig. 1b), in which it is possible to adjust your personal profile, set the daily training program on the calendar, review existing standards and compare your own results with them, as well as view statistics of physical activity performed for the selected period workouts.

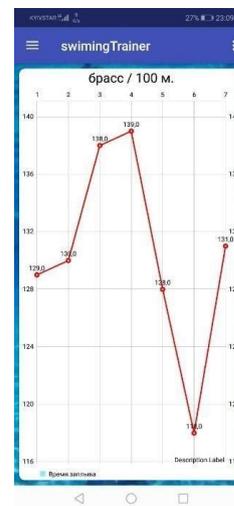
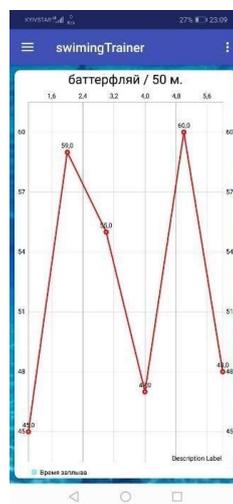
By clicking on the “Profiles” tab, the user can again return to the data logging tab and adjust it. When the “Calendar” function is activated, a window opens in which the days when the training session takes place are selected. Dots mark the most active days with high training loads. These days, the training process indicators are recorded. All previous results can be viewed by referring to the function “View statistics.” Also, all previously entered results can be analyzed using mathematical statistics by activating the function “Statistics”.

When you click on the "Statistics" button, a window opens (Fig. 2a), in which the athlete can choose a swimming style. If an athlete trains only in some of these styles, then he doesn't activate others, but only uses them. The study involved young athletes 10-14 years old, who are actively involved in all types of swimming. During the survey, the dominance of such swimming styles as breaststroke, crawl on the back and free style was revealed.

The SwimmDiary mobile application included the basic swimming styles provided by the program for constructing training sessions for young swimmers: butterfly stroke, breaststroke, crawling on the back, freestyle and integrated swimming style. By clicking on each of these swimming styles, you can activate the bookmark with the definition of the length of the distance. For each swimming style, young athletes choose different distances: in Butterfly 25m, 50m, 100m, 200m; breaststroke 25m, 50m, 100m, 200m, 400m, 800m, 1500m; in crawling on the back 25m, 50m, 100m, 200m, 400m, 800m, 1500m; in the freestyle 25m, 50m, 100m, 200m, 400m, 800m, 1500m.



a) window for choosing the style of swimming



b) statistical analysis of indicators

Fig. 2. Features of the "Statistics" function

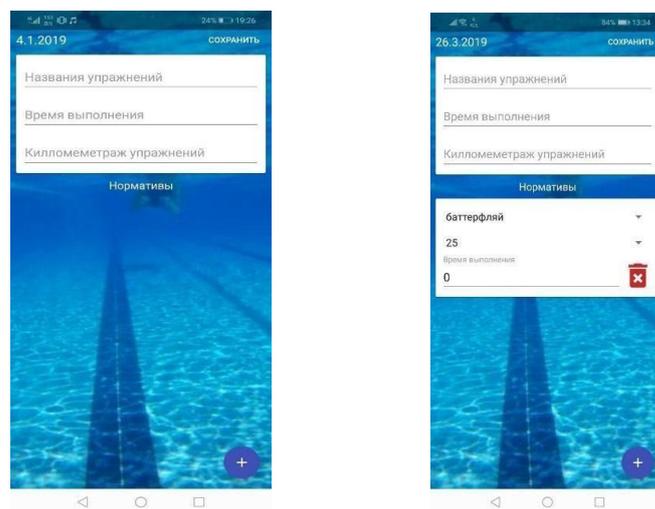
In each age group of athletes, different styles of swimming and distance are dominate. So, for the 10-11 years old athletes breaststroke and freestyle are more characteristic, and among distances trainers prefer segments of up to 200 m. For the

10-11 years old athletes, there is also a crawl on the back, distances increase to 400 m. Young swimmers 14 years and older, who already have basic training in swimming, can master the style of butterfly stroke and complex combinations of types of swimming, their functional capabilities allow training loads in swimming distances of 800 m and 1500 m.

After the training session is over, each young athlete with the SwimmDiary application configured on his mobile phone will enter the time for each distance. The program gives statistical indicators (Figure 2b.) Swimming of each segment of the distance. The Y-axis diagram shows the time taken to complete the distance in seconds. The indicators are not reflected in the usual form 1-25", but in the full format of seconds - 85". The X axis represents the days on which the training sessions were held. At the intersection of the X and Y axes, a performance indicator of the young athlete is formed. In fig. 2b it is shown that the athlete showed the best result in passing the 50 m butterfly stroke in the first training session (45 s), fourth (47 s) and sixth (48 s) lesson. Also, the red graph curve indicates the dynamics of changes in the performance indicator in this style over the course of a week.

In a similar way, one can analyze the effectiveness of passing other distances over a longer period of time. Figure 2b analyzes the performance of passing a distance of 100 m breaststroke for one week. It is shown that the athlete received the best result in the sixth training session. The coach and the athlete can analyze, using the mobile application presented in the study, previous achievements, completed physical exercises and physical activity, which contributed to a significant improvement in sports results.

The SwimmDiary mobile application allows you to enter information on the use of funds in a training session, general developmental exercises, breathing exercises, physical exercises on land, special preparatory exercises, exercises with objects, water exercises, swimming distances with additional equipment and other tools and methods. The following indicators are entered: the name of the physical exercise, the time of its completion, the mileage of the preparatory exercises to cover the main distance (Figure 3a).



a) data entry window

b) window for activating standards

Fig. 3. A window for entering information on physical exercises performed in a training session and comparing with standards

If the young athlete was absent from the training session for objective reasons, then he can review the physical exercises performed by others in the training session if he enters the general database on the server. He may also review the training loads planned for the next training session, provided that the trainer places this information for public access. Another feature of the developed SwimmDiary application is the ability to copy a physical exercise and training program for a while ahead from the network server. This option allows the young athlete to warm up and feed precisely those muscle groups that will be most actively involved in the training before starting a training session. Also, an athlete can, knowing preliminary information about training, adjust the training load according to his individual physical condition and well-being. By clicking on “+”, an additional window with standards can be activated, thanks to which the young athlete can analyze and compare his own results (Figure 3b).

Thanks to this feature, young athletes can, using a mobile application, analyze and compare their own results with standards, understand at what level they are swimming the distance and how much they need to improve their own results. The “Standards” option is programmed in this way to stimulate and motivate young

swimmers to do swimming and to get the best performance. If it becomes necessary to correct, add or delete a training session, the user can click on any day in the Calendar tab and perform the necessary function, for example, add training. Thus, the developed SwimmDiary mobile application is multifunctional, it allows you to plan and record training and physical activities in swimming, both for young and adult athletes. To solve the research tasks, a questionnaire was conducted, the main purpose of which was to identify the respondents' attitude to the SwimmDiary mobile application on a 12-point scale (Figure 4). An analysis of the results indicates a high level of assessment of the majority of respondents, almost half of the respondents gave points from 10 to 12.

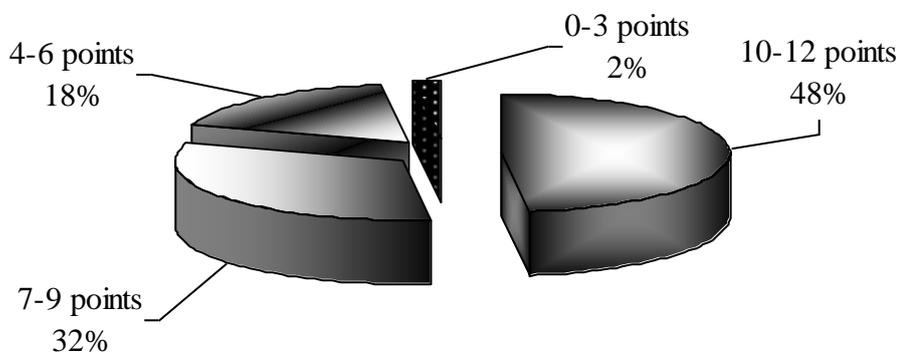


Fig. 4. Percentage of ratings of the mobile application "SwimmDiary"

Young athletes dominate in the quality ratio of the ratings (Figure 5), who on average rated the development at 11.2 ± 0.07 points, trainers (10.9 ± 0.06) and scientific experts (10.5 ± 0.05) rated the development at approximately the same high level; parents of young athletes gave low ratings for development (8.3 ± 0.08).

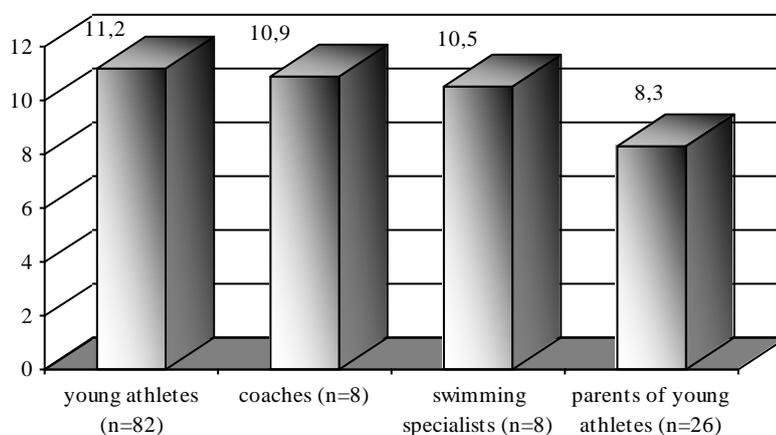


Fig. 5. Respondents' ratings of the SwimmDiary mobile application on a twelve-point scale

Another important factor in the expert evaluation during the survey was to determine the respondents' attitude to the program components. 84 respondents (70%) expressed their positive attitude to the design of the program, 66 (55%) expressed for the application design, 30 (25%) for the structure of the mobile application, 48 respondents liked the mobile application (40%). In general, 12 respondents (10%) did not like anything. The data obtained allows us to identify the strongest components of the program (design solution and presentation of the mobile application) and weak (data visualization). This leads to the conclusion that the structural components of the program should be somewhat simplified, as well as the quality of visual information should be improved.

To establish the reliability of the answers of the respondents, who are actually subjective to information, a correlation analysis was carried out according to the Spearman method. The analysis made it possible to find the coefficient of rank correlation of the correspondence of the rating given by the respondent for the mobile application and his knowledge with other similar developments. This indicator indicates the presence of interconnection, indicates the consistency of expert opinions and can be interpreted as one of the factors for assessing the quality of the developed SwimmDiary mobile application.

Conclusions / Discussion

During the study, issues of attracting information technology to the process of training swimmers were considered. It has been established that the use of modern innovative information technologies in the educational process of young swimmers is an innovative and relevant research area in the field of physical culture and sports. The SwimmDiary mobile application has been created on the Android Studio and Java platforms. The development is aimed at individualizing control and planning the volume of physical activity in young swimmers. The SwimmDiary mobile application allows you to enter information on the use of funds in a training session, general developmental exercises, breathing exercises, physical exercises on land, special preparatory exercises, exercises with objects, physical exercises on water, swimming distances with additional equipment and other tools and methods.

The questionnaire revealed a high level of assessment of respondents of the SwimmDiary mobile application (48%) and pointed to the strongest components of the program (design solution and presentation of the mobile application) and weak (data visualization). It was established that the young athletes liked the development the most ($11,2 \pm 0,07$), and their parents gave low marks ($8,3 \pm 0,08$) on a 12-point scale. The coefficient of rank correlation indicates the consistency of opinions of respondents.

In the **future prospect of further research**, it is planned to develop mobile applications for optimizing the educational process and analytical support of competitive activity in game sports.

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

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