

Enhancing football training methodology in the macrocycle for 9-10-year-old boys

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Abstract:

Modernizing the football training process for primary school students in extracurricular physical education is an urgent task. Optimizing the effectiveness of extracurricular physical education and sports is crucial in fostering increased physical fitness levels, developing interest in physical activity, and promoting the basics of a healthy lifestyle among children. **Purpose:** This study aims to enhance the physical and technical fitness of 9-10-year-old boys by refining and testing a methodology for teaching football in school sports programs. **Material and methods.** The research project was carried out on the basis of a secondary school in Chelyabinsk (Russia). There were 28 young athletes who played football in the school section during non-school hours under supervision. The control group (n = 14) trained in accordance with the additional general educational program of physical culture and sports orientation "Football". The experimental group (n= 14) studied according to our improved method of annual macrocycle training. In both groups, training sessions were held three times a week for 60 minutes. The high-stakes testing of general, special physical fitness and the state of technical competence was carried out. **Results.** Our improved method of training boys aged 9-10 in the system of extracurricular physical education has shown high efficiency. At the end of the research, the boys of the experimental group had statistically significantly increased values of indicators in all tests of general, special and technical competence compared with the control one, where the traditional "Football" program was used. **Conclusions.** The improvement of the training schoolchildren's method in the popular game of football in the system of extracurricular physical education has led to an increase in the physical condition and motivation for young athletes' regular motor activity.

Key Words: Physical Education, Physical Activity, Football, Physical Fitness

Introduction

One of the priority areas for the use of means and methods of physical culture and sports is the preservation and strengthening of human health (Görner, & Reineke, 2020; De la Camara et al., 2021). It is especially necessary for the younger generation (Budzynski-Seymour et al., 2020). Numerous observations by scientists in many countries of the world indicate negative indicators of children's, adolescents' and youth's state of physical, mental and somatic health (Glazkova et al., 2020; Drenowatz, 2021; Tortella, et al., 2021; Tomás Reyes-Amigo, 2021). Monitoring of students' state of health and physical fitness, the harmony of the physical development, indicates an annual increase in the number of students with weak reserve capabilities. According to medical examinations for physical education, more than 25% of students belong to a special medical group in which physical education requires strict attention from teachers. Such children are not allowed to participate in any sports events and pass the standards of the "Ready for Labor and Defense" complex (Momot et al., 2020). The number of children and adolescents with postural status disorders continues to increase (Metelnikov et al., 2024), diseases of the cardiorespiratory system, hormonal disorders that manifest themselves in the form of obesity and diabetes (Ding et al., 2020).

Therefore, it is important to involve the younger generation in regular physical activity, which allows

them to increase their level of physical health, psycho-emotional stability and reserve capabilities of the body (Setiakarnawijaya et al. 2021; Ming Hui Li et al., 2022).

Often, traditional PE classes in educational institutions do not provide the necessary health-improving result for those involved. One of the reasons for this is the insufficient number of academic hours devoted to the development of "Physical Education" discipline (Hills et al. 2015) and the overestimated academic level of classes (Tuan, 2022). The regulations of educational programs, insufficient funding and a shortage of physical education personnel in educational institutions do not allow to increase study time. Therefore, scientists in the field of physical culture and sports recommend widespread use of self-exercise (Zorio-Ferreres et al., 2018; Jessica et al., 2020).

School extracurricular physical education activity is a system of additional physical exercises in their free time, in particular, in sports sections. Additional classes strengthen health and promote harmonious physical development. The participation of students in extracurricular physical education and sports activities develops their interest in regular physical education and sports. Aerobic exercise has become especially popular for additional classes (Romanova et al., 2023) and a variety of sports games (Montesano, 2018; Tuan, & Cuong, 2022; Kolokoltsev et al., 2023).

According to experts, football, a popular sport among primary school children, may become one of the promising areas within the framework of organizing and conducting sectional work in a comprehensive school for them (Kryzhevskikh, & Mishchenko, 2022). Playing football forms and improves a person's motor qualities and skills and increases the reserve capabilities of the body. Football can be used as a means of children's harmonious physical development. In addition, year-round football lessons in difficult climatic and meteorological conditions harden the body, increase resistance to diseases and increase the body's reserve capabilities. An important role is assigned to human outdoor sports games as an effective means of active recreation (Singh et al., 2020; Tortella et al., 2021). They increase motivation for physical activities among young men involved in football (Wilder Geovanny Valencia Sánchez, & Elkin Alberto Arias Arias, 2021).

Football training is conducted both in school PE classes and in sports sections. Teachers of extracurricular physical education and PE teachers often face problems when using training programs in training sessions. Teachers note the insufficient number of training hours that are allocated for the technical and tactical training development in football. There are difficulties in implementing a systematic approach that covers the issues of technology for learning how to play football. Therefore, the urgent task of specialists in sports is a comprehensive study of the possibilities of further using the potential of football to preserve and improve young people's health. The problem of modernizing the method of using football in the school system of extracurricular physical education remains urgent. An analysis of the scientific literature indicates an insufficient number of research papers devoted to the game of football for children aged 9-10 in the process of extracurricular physical education. The materials of scientific research and teaching aids relate to the teaching of football to older children (Kryzhevskikh, & Mishchenko, 2022). The implementation of the initial training of the game of football is often carried out by adjusting the educational programs of "Physical Culture" subject and cognitive and educational activities. We believe that the results of our research will make it possible to fill the gap in scientific knowledge of this issue, which will increase the effectiveness of football training sessions, physical and technical readiness of children attending primary classes.

Purpose: To improve the level of physical and technical competence of boys aged 9-10, to improve and test the method of teaching football within the school sports section.

Material & methods

The research project was carried out from September 2022 to May 2023 on the basis of secondary school No 124 in Chelyabinsk (Russia). As part of extracurricular activities, a football section was organized for extracurricular physical education for 28 boys aged 9-10 (9.4 ± 1.2). All parents have given written voluntary consent to the examination of their children, which does not violate the ethical norms and principles of the Helsinki Declaration of 2003.

According to the randomized method, the subjects were divided into two groups of 14 people each: the control group (CG) and the experimental group (EG). The control group was engaged in accordance with the standard educational and training program of sports training for children and youth sports schools ("Football: standard educational and training program for sports training for children and youth sports schools, specialized children's and youth schools of the Olympic reserve, 2011"). The experimental group was engaged in the improved method of playing football, proposed by us. Young athletes from both groups attended training sessions, lasting 60 minutes, three times a week.

The experimental method of the training sessions took into account the key methodological principle that the age of 9-10 is a favorable period for young football players' playing technique, motor skills and abilities development. The initial development of the football game began with teaching children various methods of movement techniques on the football field and performing basic techniques of playing with a ball and a set of running exercises of varying complexity.

For EG athletes, the method of the annual macrocycle training sessions has been improved, which is based on the circular training method and the use of special exercises, developed by us. These were exercises that included preparatory, lead-up up and general developmental ones. This technique contained training in various types of running: at different speeds, on an inclined surface (up and down), overcoming obstacles, with imitation techniques of passing the ball. We used running starts, jumping and playing exercises, tasks of individual direction, taking into account the rules of ball handling and receiving it by various parts of the body.

The improved experimental method of teaching football to children aged 9-10 provided basic methodological approaches and principles. This is the use of the basic methodological requirements that are imposed on the exercises performance in the training process. The implementation of the optimal sequence of teaching football technique, at the beginning, the technique of movement is studied, and then the technique of the ball possession. Identification and correction of gross technical errors, minor errors are eliminated later. The use of the game method and basic means aimed at the development of physical, technical, and tactical preparedness is also studied. When improving the training method for the experimental group, attention was paid to the selection of effective special preparatory exercises and outdoor games. Various attention exercises and systematic use of the circular training method (once a week) were used. This technique is based on an integrative approach to organizing and conducting training sessions with young football players.

The training sessions included an introductory part (12-15 minutes); the main part (25-30 minutes) and the final part (6-8 minutes).

In the main part of the training session, the "School" exercise was used, when athletes are divided into pairs and play the ball with different techniques. The elements of juggling the ball individually and in pairs were learned; exercises for receiving the ball with a certain part of the foot, which rolls down; exercises for receiving the ball with the inner part of the foot; flying on the hip, on the chest, Table 1.

Table 1. A set of exercises with a ball for the experimental group of boys

Station number	Exercises description	Duration, min
1	In pairs, passing the ball with the inside of the foot	1
2	In pairs, the ball is played with the inside of the foot	1
3	Elements of ball juggling	1
4	Exercises with a ball on the abdominal muscles	1
5	Receiving a flying ball on the hip	1
6	Dribbling the ball between the cones with the right and left foot, the inner and outer part of the foot	1

Taking into account the importance of developing attention in EG athletes, some types of game elements were used in the main part of the classes:

1. The game "Attention to the signal". At the signal of the coach's whistle, the athlete needs to move the ball around the court in various ways, at the second signal of the whistle, the athlete stops.

2. The game "Attention to the blow". Athletes line up at the start line. At the signal of the coach's whistle, they begin to drive the ball in front of them to the opposite field line.

3. The game "Who will send the ball farther". The boys are divided into pairs and put their balls on the line. Athletes compete on the strength of hitting the ball among themselves. Then, at the signal of the coach, they hit the ball.

Control tests were used for the high-stakes testing of the boys' physical fitness. General physical fitness was assessed according to the results of the tests:

"Shuttle run 3x10 m", s;

"Run 10 m from a high start", s;

"Run 30 m", s;

"Standing long jump with a push with two legs", cm.

The tests "Run 30 m with dribbling the ball", s; "Run 5x30 m with dribbling the ball", s; "Three hits on the ball in depth with the right foot, the sum of the strokes", m; "Three hits on the ball in depth with the left foot, the sum of the strokes", m; "Throwing the ball with hands in depth", m was used to assess special physical fitness.

Technical readiness was assessed according to the results of the tests "Dribbling the ball 10 m", s; Dribbling the ball with a change of direction 10 m», s; "Dribbling the ball 3x10 m", s; "10 shots at the goal for accuracy", the number of hits, times.

The obtained digital data were processed using parametric statistics methods. The arithmetic mean and its errors were calculated. The statistical significance of the difference in the values of the indicators was calculated according to the t-Student criterion. Statistically significant values were taken at $p < 0.05$. The Statistica 12.0 computer software package from Stat-Soft Corporation (USA) and Microsoft Office Excel 2017 (USA) were used.

Results

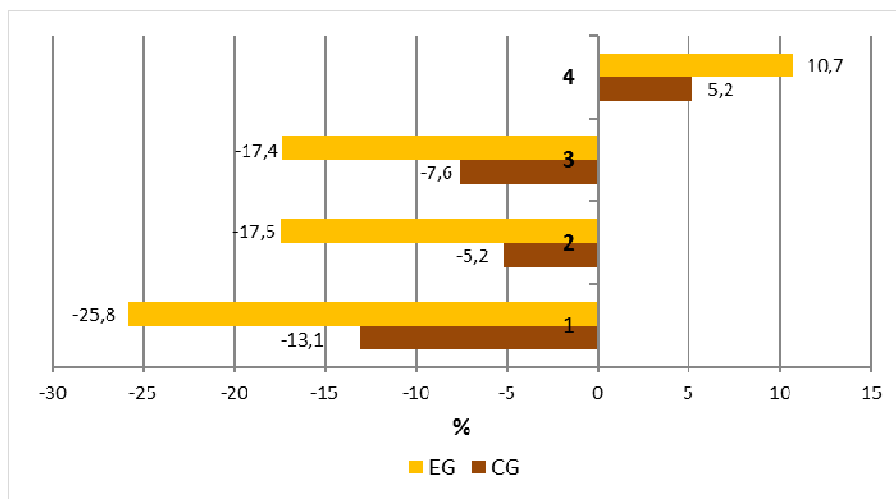
The high-stakes testing results of the boys' general physical fitness are presented in Table 2.

Table 2. Values of the high-stakes testing indicators of the boys' general physical fitness $M \pm m$

Tests	CG (n=14)		EG (n=14)	
	At the beginning of the project	At the end of the project	At the beginning of the project	At the end of the project
1. Shuttle run 3x10 m, s	12.2 ± 1.24	10.6 ± 1.19	12.4 ± 1.36	9.2 ± 1.14*
2. Run 10 m from a high start, s	2.68 ± 0.21	2.54 ± 0.19	2.69 ± 0.23	2.22 ± 0.14*
3. Run 30 m, s	6.8 ± 0.48	6.3 ± 0.37	6.9 ± 0.56	5.7 ± 0.24*
4. Standing long jump with a push with two legs, cm	142.2 ± 6.53	149.6 ± 6.59	143.3 ± 6.65	158.6 ± 7.23*

Note. * a significant difference in the values of the test indicators at the end of the research project ($p < 0.05$)

At the research beginning, the level of the boys' overall physical fitness was approximately the same in both groups. It is evidenced by the absence of a statistically significant difference between the values of the CG and EG indicators, $p > 0.05$. At the end of the project, an increase in the values of general physical fitness indicators in both groups was established. A significant increase in the values of indicators at the end of the project compared with the research beginning was noted in football players only in the experimental group, $p < 0.05$. The increase in the overall physical fitness of boys in both groups at the research end is shown in Figure 1.



Note: 1, 2, 3, 4, - motor tests numbers

Fig. 1. The increase in the values of indicators in the general physical fitness tests of the boys at the end of the research project

The percentage of increase in the values of general physical fitness indicators was significantly higher in all tests for EG boys, where we used the improved method of training young football players in an annual macrocycle. The highest value of the increase in indicators was found in test 1 ("Shuttle run 3x10 m") and test 2 ("Run 10 m from a high start"). The high-stakes testing results of the boys' special physical fitness are presented in Table 3.

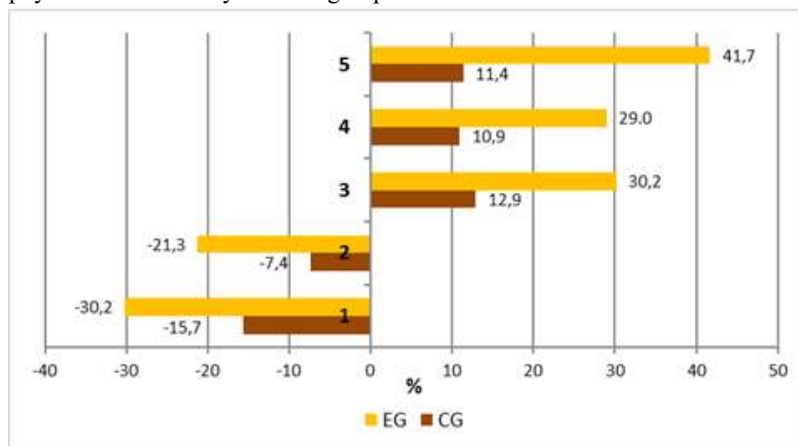
Table 3. Values of high-stakes testing indicators of the boys' special physical fitness $M \pm m$

Tests	CG (n=14)		EG (n=14)	
	At the beginning of the project	At the end of the project	At the beginning of the project	At the end of the project
1. Run 30 m with dribbling the ball, s	10.8 ± 2.98	9.1 ± 2.83	10.9 ± 2.21	7.6 ± 1.72
2. Run 5x30 m with dribbling the ball, s	58.4 ± 5.42	54.1 ± 5.05	59.2 ± 5.54	46.6 ± 4.23*
3. Three hits on the ball in depth with the right foot, the sum of the strokes, m	26.4 ± 3.32	29.8 ± 3.43	25.2 ± 3.28	32.8 ± 3.16*
4. Three hits on the ball in depth with the left foot, the sum of the strokes, m	23.8 ± 3.24	26.4 ± 2.37	23.1 ± 3.19	29.8 ± 2.45*
5. Throwing the ball with hands in depth, m	4.4 ± 0.64	4.9 ± 1.52	4.8 ± 0.69	6.8 ± 1.22*

Note. * a significant difference in the values of the test indicators at the end of the research project ($p < 0.05$)

At the beginning of the research project, CG and EG boys did not differ in the development of special physical fitness, as evidenced by approximately the same values of indicators in all motor tests, $p > 0.05$. At the end of the project, an improvement in the special physical fitness of football players in both groups was noted.

Statistically significantly better results were found in EG boys in four of their five tests. The increase in the indicators of special physical fitness of boys in both groups at the end of the research is shown in Figure 2.



Note: 1, 2, 3, 4, 5 — motor tests numbers

Fig. 2. The increase in the values of indicators in the tests of special physical fitness of the boys at the end of the research project

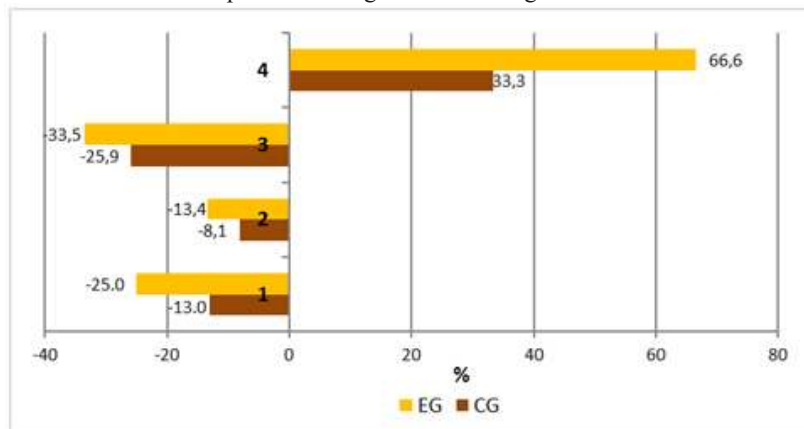
At the end of the observation, the increase in the indicators of testing special physical fitness of boys was significantly higher in the experimental group compared with the control one. The largest increase was recorded in test 5 ("Throwing the ball with hands in depth, m") and tests 1 ("Run 30 m with dribbling the ball") and 3 ("Three hits on the ball in depth with the right foot, the sum of the strokes, m"). The high-stakes state of the values of the boys' technical readiness indicators is presented in Table 4.

Table 4. The values of the high-stakes testing indicators of the boys' technical competence, M±m

Tests	CG (n=14)		EG (n=14)	
	At the beginning of the project	At the end of the project	At the beginning of the project	At the end of the project
1. Dribbling the ball 10 m, s	4.6 ± 0.42	4.0 ± 0.33	4.8 ± 0.54	3.6 ± 0.28*
2. Dribbling the ball with a change of direction 10 m, s	9.9 ± 2.41	9.1 ± 2.22	9.7 ± 2.36	8.4 ± 1.62
3. Dribbling the ball 3x10 m, s	13.79 ± 2.34	10.21 ± 2.29	13.84 ± 2.37	9.21 ± 2.11*
4. 10 shots at the goal for accuracy, the number of hits, times	3.0 ± 0.24	4.0 ± 0.16	3.0 ± 0.26	5.0 ± 0.29*

Note. * a significant difference in the values of the test indicators at the end of the research project ($p < 0.05$)

At the research beginning, the technical competence of boys in both groups was approximately the same, $p > 0.05$. At the end of the project, an increase in the level of technical competence of all football players was established. A statistically significant difference in the indicators of technical competence tests was registered in boys of the experimental group. They found a statistically significant increase in the values of indicators in three of the four tests compared to the beginning of the research project, $p < 0.05$. The value of the increase in the indicators of technical competence testing is shown in Figure 3.



Note: 1, 2, 3, 4 — technical competence tests numbers

Fig. 3. The increase in the values of indicators in the technical competence tests of the boys at the end of the research project

The results of the conducted research on the use of the proposed methodology for training young football players in the educational and training process have shown its effectiveness. At the end of the research project, the increase in the values of technical competence indicators was significantly greater in the boys of the experimental group than in the control one. The most significant increase was noted in test 4 ("10 shots at the goal for accuracy, the number of hits, times") and test 3 ("Dribbling the ball 3x10 m, s").

Dicussion

The priority task of physical culture and sports among young people is to improve health, quality of life and develop healthy lifestyle skills (Görner, &Reineke, 2020; De la Camara et al., 2021). Many researchers indicate that inactivity in children and adolescents causes a significant deterioration in physical, somatic and mental health (Tortella, et al., 2021; Tomás Reyes-Amigo, 2021; Drenowatz, 2021). One of the most relevant areas of physical culture and sports is the involvement of children, adolescents and young people in motor activity. It is due to the relatively low interest in classes among students who are engaged in a generally accepted physical education program (Tuan, 2022). In recent years, additional forms of physical culture and sports activities have become more widely used in educational institutions in the form of the use of popular sports (Zorio-Ferreres et al., 2018; Jessica et al., 2020) or aerobic exercises (Romanova et al., 2023).

One of the organizational forms of increasing the physical activity of students is additional physical education outside of school hours. Therefore, the development and testing of the proposed football training method for additional physical education of schoolchildren is in demand. We agree with the opinion of R. Montesano (2018) that the implementation of gaming sports technologies in physical education is a promising direction. It increases the motivation of children for physical activity and increases the motor density of the training lesson. The work of T. Berger et al. (2020) shows that gaming sports present the most important factors affecting people's doing sports brain development. It creates satisfaction from physical activity, which contributes to the formation of high motivation for physical education and sports activities (Biino et al., 2020; Wilder Geovanny Valencia Sánchez, & Elkin Alberto Arias Arias, 2021).

In our early research works (Mischenko et al., 2020), it was shown that the use of non-school extracurricular PE classes among schoolchildren significantly increases their motor qualities and skills. These data are consistent with the results of the present research, where the game of football was used. We found a statistically significant increase in motor test scores in boys of the experimental group. At the end of the research, the increase in the values of indicators of general physical fitness was significantly greater in all tests where the proposed improved method of training boys was used compared with the control group, where classes were conducted according to the generally accepted training method. The highest value of the increase in indicators was found in EG boys in tests for speed and coordination of movements. These motor qualities are extremely important in game sports, as we agree with the opinion of other researchers (Kolokoltsev et al., 2023).

The results of testing the special physical fitness of schoolchildren at the end of the annual macrocycle turned out to be significantly higher in children who studied using the proposed method compared with the results in the control group. The largest increase was registered in boys of the experimental group in the tests "Throwing the ball with his hands in depth", Run 30 m with dribbling the ball" and "Three strikes on the ball in depth with the right foot". Higher indicators in general and special physical fitness allowed the young football players to achieve high results in technical fitness. The close relationship between the special and technical competences of athletes is indicated by scientific research by Radiola (2019). According to our data, at the end of the research project, the increase in the values of indicators of the level of technical competence was significantly greater in all tests in boys of the experimental group compared with the control one. The largest increase was noted in the tests «10 shots at the goal for accuracy, the number of hits, times» and "Dribbling the ball 3x10 m, s". P.V. Kryzhevskikh, N.Yu. Mishchenko (2022) believe that increasing the level of special physical fitness and improving the technical training of football athletes are key factors for their successful performance in future sports competitions. It is known that the development of the coordination skill of physical fitness can increase the effectiveness of an athlete's technical fitness by up to 40% (Baginska, 2017). This conclusion is confirmed by the high indicators obtained in the present research of coordination abilities using the 3x10 m shuttle run test in 9-10-years-old boys of the experimental group. At this age, the gradual complication of the training task will be very effective.

Our research project results showed that improving young football players' training method and using it in an annual macrocycle for additional physical education turned out to be more effective than the traditional method. This is evidenced by statistically significant results of the study of the general, special and technical competence of children in the experimental group compared with the results in the control one.

Conclusions

In the conducted research project, the method for improving the conditioning abilities and technical competence of young football players aged 9-10 in the system of additional physical education has been improved and tested. At the end of the research, the young football players of the experimental group had

statistically significantly increased values of indicators of general, special physical fitness and technique of playing football in all tests compared with the results of the control one, where traditional training methods were used. The proposed methodology contains the general principles of pedagogy, the implementation of an optimal sequence of teaching football techniques, an integrated approach to the organization and conduct of training sessions, a combination of the circular training and the game methods in an annual macrocycle.

We believe that the results of our research and the proposed method can be used in designing a plan for conducting training sessions in other game sports in the system of additional physical education for children and adolescents.

Conflicts of interest. The authors declare no conflict of interest.

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