

NATIONAL SPORTS ACADEMY 'VASSIL LEVSKI'

DEPARTMENT OF 'THEORY OF PHYSICAL EDUCATION'

Stanislav Rumenov Gruev

**SPORTS GAME TRAINING IMPROVEMENT FOR JUNIOR
HIGH SCHOOL STUDENTS**

ABSTRACT

Of a dissertation for conferring the academic degree 'Doctor'

Scientific supervisor:

Ass. Prof. Todor Marinov, Ph.D.

Sofia, 2023

NATIONAL SPORTS ACADEMY ‘VASSIL LEVSKI’

DEPARTMENT OF ‘THEORY OF PHYSICAL EDUCATION’

Stanislav Rumenov Gruev

**SPORTS GAME TRAINING IMPROVEMENT FOR JUNIOR
HIGH SCHOOL STUDENTS**

ABSTRACT

Of a dissertation for conferring the academic degree ‘Doctor’ in a professional field 1.3. Pedagogy of Training in the Doctoral program ‘Physical Education in the Education System’

Reviewers:

Prof. Yordan Kostadinov Ivanov, Ph.D.

Ass. Prof. Kornelia Nikolaeva Naidenova, Ph.D.

Scientific supervisor:

Ass. Prof. Todor Marinov, Ph.D.

Sofia, 2023

The dissertation contains 166 standard pages of text. It is illustrated with 39 tables and 17 figures. The bibliographic reference includes 137 literary sources - 104 by Bulgarian and 33 by foreign authors. Information from 24 documentaries and 2 internet sources was used. The dissertation includes 4 appendices.

The dissertation work was discussed and directed for public defense before a scientific jury at an extended meeting of the Department of 'Theory of Physical Education' at the NSA 'Vassil Levski', held on 03.10.2023.

The public defense of the dissertation work for conferring the academic degree 'Doctor' will occur on 06.12.2023 at 2:00 p.m. in the NSA 'Vassil Levski,' lecture hall A3, Students' Town of Sofia.

INTRODUCTION

Science and technology progress, along with the advantages it provides, has a negative impact on people's health. The development of technology has significantly limited human motor activity. Children are very susceptible to the lack of movement, and it is vitally necessary for them, during the period of growth and maturation, to achieve optimal physical and mental development stimulated and supported by physical activity.

School age is a period related to adolescents' education and training. Developing personalities through moral, volitional, intellectual, aesthetic, and physical education is the foundation for successful future realization. Adequate training in physical education through the compound solution of the tasks connected with education and health will favor increasing motor activity and leading a healthy lifestyle.

Transitioning between the primary and junior school stages is critical for students' motor activity levels. A decrease in students' desire for physical activity is noticed after transitioning to upper age. An argument for this is the end of a particular period in children's development, prompting them to strive to satisfy this natural 'hunger' for movement. What characterizes this need for movement is that it is ephemeral. After the subsidence and passing of this period, children should develop a conscious and meaningful need for motor activity. This transition must be supported by knowledge about the benefits of movement and education of lasting and sustainable behavior toward physical activity and sport.

Positive emotions, socialization, and teamwork are essential factors that should also be used to overcome low levels of motor activity. Sports games are a field of physical education characterized by a high emotional charge, compound development of motor qualities, and specific technical skills. The pleasure of the game, the pursuit of the goal, and the achievement of results naturally increase the students' physical activity. The lack of emotion and monotonous and isolated physical exercise cannot successfully resist the temptation that information technology provides to the young generation. In addition, participation in games favors the formation of specific perceptions and develops and refines skills in a natural environment; students learn to make independent decisions and acquire competencies in and through the game.

Our observations showed that the lack of knowledge about the benefits of playing sports and the monotonous, imitative, static, and boring study of exercises repelled and did not engage students' attention. New approaches for mastering

Physical Education and Sport content at school should be found. Therefore, our research aimed to develop a methodology for teaching sports games, improving students' activity, and increasing their technical preparation and physical ability. As a result of a study and analysis of the contemporary dimensions of physical education, training, and age characteristics, and the possibilities for improving teaching in sports games, we developed and tested in practice an advanced football and volleyball methodology for junior high school students, which was based on knowledge, game exercises, and skills development in a variable, game environment.

PROBLEM STATEMENT

The effectiveness of training depends on improving teaching and learning processes, on the content of training, as well as on stimulating activity and forming attitudes.

From a psychological point of view, influencing inner activity is directly related to needs, interests, emotions, motives, attitudes, and motivation. It is necessary to positively impact the inner side of the personality to achieve a lasting, conscious, long-term effect on volitional activity. Providing knowledge about the benefits of physical activity helps increase activity.

Such an approach is a significant emphasis in physical education training, which includes elements that will contribute to increased motor activity and training results.

The competency-based approach in physical education can be implemented through compound work on motor skills and qualities, practical significance - real situations in games, creativity to react in a random variable environment, creativity and initiative, and results tied to the goal in the competition.

Using the tactical game approach and learning through games, technical skills are built not in isolation but during the game. This contributes to their more successful implementation in a real-game environment.

To achieve general or high-level motor skills (regardless of the type of sport or motor activity) using the standard training model, one should first develop a motor habit in easy training conditions. In alternative learning, the transfer from general to higher-level skill is achieved by improving different, variable game conditions.

Training in standard conditions does not contribute to developing skills applicable in dynamic, changing conditions typical for sports games.

A key skill in football and volleyball, the two games our training was based on, is the movement towards the ball and its quick handling. Their dynamic implies an immediate reaction and limits the time to consider the situation. This, in turn, requires consideration of the opponent, teammate, ball, and anticipation of the situation, which is successfully achieved through game improvement. The isolated learning of the elements out of game situations implies difficulty in their transition in a real game environment and inapplicability by the characteristics of the sport.

The training needs to be tailored to the motor activity, and the learning process should be suitable for the specific conditions typical for the different sports and, more specifically, the specifics of the two sports games.

The study carried out in the field of training on sports games in the process of Physical Education and Sport showed inefficiency - related to the wrong formation of habits in non-stereotypical movements, which were difficult to transfer to the variable environment of the sports games. Using a standard methodology, including gradual training and static exercises, does not contribute to an increase in activity. The psychological side of training should also be considered and, combined with providing knowledge about the benefits of movement, to increase motor activity and achieve lasting interest and sustainable behavior towards sports activities. Giving students the freedom to play and have fun, learn to make decisions, and overcome game difficulties by applying a competency-based and tactical approach will significantly improve their physical and technical training.

A WORKING HYPOTHESIS:

Our pedagogical observations, the in-depth theoretical justification of the problem, and above all, our pedagogical experience resulted in the following working hypothesis:

We assume that applying advanced methodology in football and volleyball, based on specialized knowledge, game exercises, and developing high-level motor skills in a variable game environment, will increase students' technical preparation and physical performance in the junior high school stage.

AIM, TASKS, METHODOLOGY, AND ORGANIZATION OF THE RESEARCH

II.1. Aim and tasks of the study

The study aimed to create, test, and verify the effectiveness of a methodology for improving the training in sports games for students from the junior high school stage.

To realize the set goal, the following tasks were completed:

1. To analyze theory and literary sources on the problem under consideration.
2. To study the teachers' opinion about the content, structural, and distinctive features of the studying process, as well as to develop and implement a test battery for assessing the students' physical and technical level of preparation.
3. To apply an experimental methodology for football and volleyball training in Physical Education and Sport lessons.
4. To reveal the impact of the applied methodology on the students' physical ability and technical preparation.
5. To develop criteria for assessing football and volleyball technical and tactical skills.

II.2. Subject, object, and participants of the study

The subject of the study was the effectiveness of the advanced methodology for sports games training with students from the junior high school stage.

The object of the study was the training in physical education and sports.

Participants in the study were ninety-eight students in their sixth grade at 34 'Stoyu Shishkov' Primary School, Sofia. The sample of students studied included two randomly selected classes as an experimental group and two classes as a control group.

II.3. Research Methodology

The research was conducted in the 34th Primary School 'Stoyu Shishkov' in Sofia in the 2021/2022 school year. Before running the experiment, we tested the students on the five motor tests from the system for assessing the students'

physical ability from I to XII grades, developed and implemented in practice in 2019 and approved by the Minister of Education and Science. We added five more tests to cover all aspects of physical ability and tests to determine physical readiness related to specific motor activities in football and volleyball. We also tested the study participants on five tests to assess their technical skills in football and volleyball. With the students from the experimental group, we conducted football and volleyball training with our proposed methodology in two consecutive school terms. For the same period, the students from the control group were taught according to a standard methodology discussed in the literature review. After the experiment, we tested the students again with the tests included in the battery. Students from both groups were also assessed on their ability to participate in a football and volleyball game.

Characterization of the research methods

To achieve the goal and solve the set tasks, we used the following scientific methods: 1. Study of literary sources; 2. Questionnaire; 3. Pedagogical monitoring; 4. Pedagogical experiment; 5. Sports-pedagogical testing; 6. Expert assessment; 7. Mathematical and statistical methods: 1) Variation analysis; 2) Hypothesis testing; 3) Correlation analysis; 4) Frequency analysis.

Pedagogical experiment

The pedagogical experiment was conducted within two school terms - 40 lessons (20 with the theme of football and 20 with the theme of volleyball). The experimental group was trained in football and volleyball with our proposed methodology. At the same time, the students from the control group were trained in these two sports according to the standard methodology. Initial training in football was carried out with both groups, including the study of technical elements that were part of the already passed learning content on the subject in previous grades (III - V grades). The initial training in volleyball was by the learning content for the students in grade VI, when, according to the curricula, the study of the sport was supposed to begin.

II.4. Organization of the study

The study was conducted in four stages from November 2020 to October 2023.

RESEARCH RESULTS ANALYSIS

III.1. Analysis of the results from the conducted questionnaire with Physical Education and Sport teachers.

The questionnaire conducted with Physical Education and Sport teachers gave us an idea of the teaching activity's content, structural features, and distinctive features.

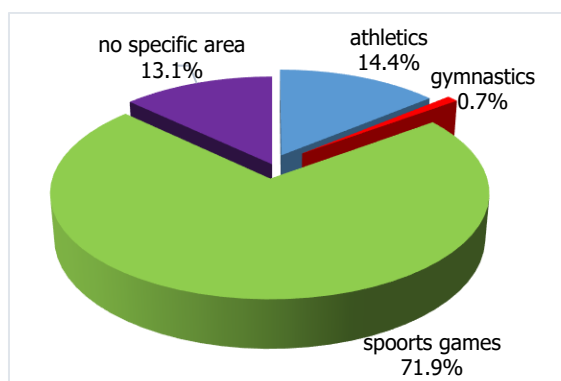


Fig. 1. Priority area of work

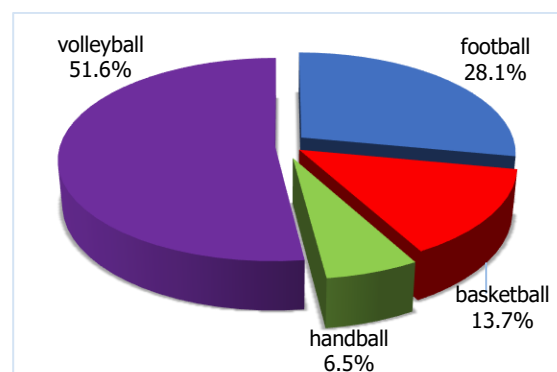


Fig. 2. Priority choice of sports teachers' game by students

Almost two-thirds (71.9%) of the participants indicated that in their work as physical education and sport teachers, they prioritize sports games (Fig. 1). 'Athletics' being part of the compulsory content was listed by 14.4%, and only one teacher (0.7%) identified 'Gymnastics' as their priority choice. Those who do not emphasize a specific area (13.1%) also found a place in the questionnaire.

The teachers surveyed indicated that more than half of the students (51.6%) demonstrated great pleasure and displayed high levels of motor activity in playing volleyball (Fig. 2). 28.1% considered football as students' priority choice, and 13.7% identified basketball as such. The teachers' observations showed that only 6.5% of the students preferred and willingly participated in handball.

More than half of the participants in the questionnaire (51.6%) answered that they started their volleyball training with the element – an overhand pass (Fig. 3). Approximately equal numbers of teachers started their instruction with an underhand pass (7.8%) or service (7.2%). A third of the teachers (33.3%) believed that learning other sports techniques should precede learning the additional elements. Regardless of the meaning of the word, additional or secondary, the elements involved in this technique, such as movements, are fundamental to volleyball, and as indicated in the literature review, the footwork and movement to the right place are of utmost importance to the subsequent play with the ball.

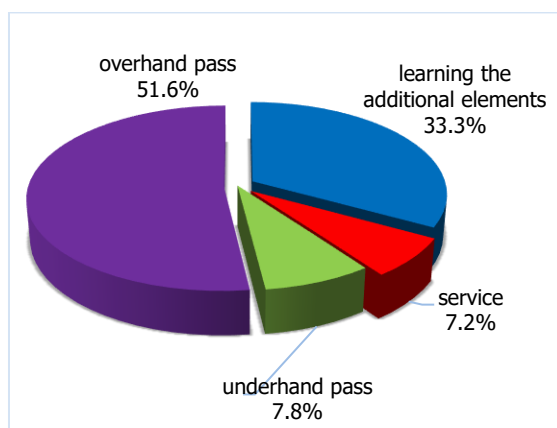


Fig. 3. Starting volleyball training

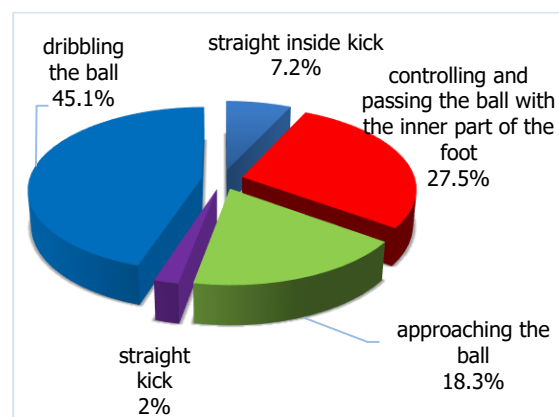


Fig. 4. Starting football training

The answers to the question about the element of the football technique the teachers put in the first place in their training showed that 45.1% of them started with dribbling the ball (Fig. 4). In the second place with 27.5% was the combination of controlling and passing the ball with the inner part of the foot. Approaching the ball (18.3%), straight inside kick (7.2%), and straight kick (2%) were the results obtained for the other possible answers. Our methodology also starts with teaching the element of dribbling the ball.

The sequence of the groups of teaching methods shows the organization created by the teacher in the teaching process (Fig. 5).

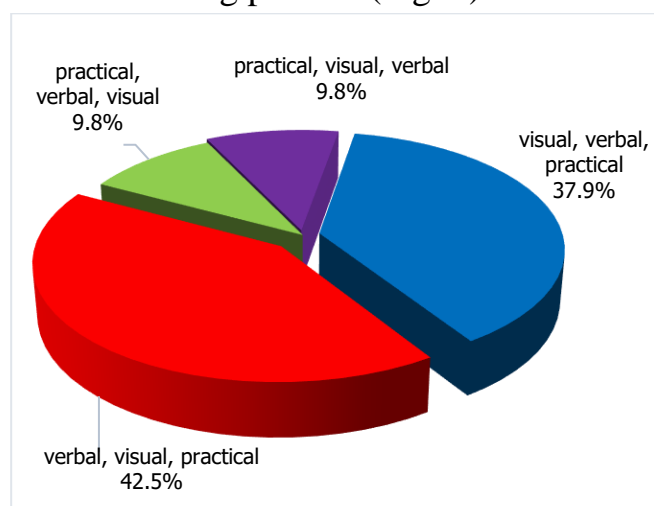


Fig. 5. Sequence of teaching methods

More than 80% start the training with visual or verbal methods to build an idea of the motor action and naturally put the practical methods in the third position. 42.5% of them consider that the learning process should begin with verbal methods by announcing and explaining the term used for the new motor task, and 37.9% emphasize visual methods to build a visual idea of the motor

action. Thirty teachers (19.6%) believe training should begin without students gaining knowledge of the studied technical element or tactical action and proceed directly to practical implementation.

The study results related to the choice of content, initial training in sports, and the development of motor skills helped us develop the experimental methodology.

III.2. Analysis of the results of the tests conducted to assess the students' motor abilities.

A significant part of the training process in physical education and sport is the development of motor abilities and their corresponding motor skills. The results of the tests as part of the students' physical ability are an essential indicator considering the level of the work done in the lessons.

The training we carried out was not divided by gender. Still, it was necessary to make this distinction in the analysis because the age of the students we studied coincided with puberty, characterized by different anatomy and physiology development levels in boys and girls.

The mean values and the significance of differences and increases in the results in boys and girls of the two studied groups before and after the training in the 30 m Run test are presented in Figure 6 and Figure 7.

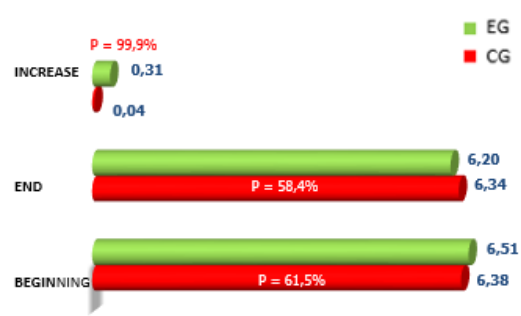
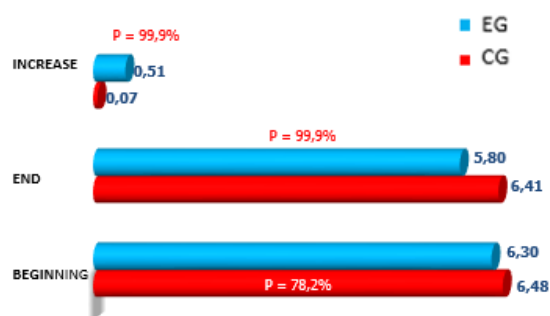


Fig. 6. Changes in '30m Running' test – boys (s) **Fig. 7.** Changes in '30m Running' test – girls (s)

Following our advanced methodology, developing quickness was devoted to improving all forms of quickness - purposefully through realizing the tasks in the lesson and comprehensively as a component of the games and game exercises.

The first testing showed no significant difference in the results of the two studied groups ($d = 0.18$ s, $P = 78.2\%$). At the end of the experiment, the difference of 0.62 s was supported by greater than 95% guaranteed probability ($P = 99.9\%$). The difference in the increase of the experimental and control groups ($d = 0.44$ s) was statistically significant ($P = 99.9\%$).

In girls, at the beginning of the experiment, the equality requirement was also met ($d = 0.13$ s, $P = 61.5\%$). The difference ($d = 0.14$ s) was also insignificant in the second study - the guaranteed probability was below 95% ($P = 58.4\%$). The insignificant difference at the end of the experiment was due to the initial indicators of the two groups, namely because, in the beginning, the students from the control group showed faster results. After the experiment, the experimental group demonstrated better average results. The experimental methodology's greater efficiency was confirmed by comparing the increase in the results in both groups. The difference of 0.27 s was considered significant because it was supported by a guaranteed probability of $P = 99.9\%$.

We applied a Medicine Ball-throwing test to check the upper limbs' explosive power.

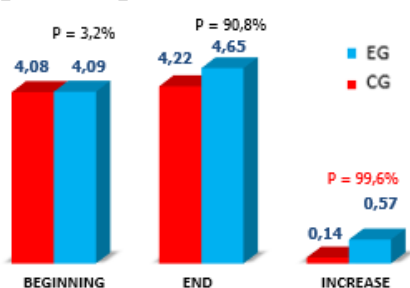


Fig. 8. Changes in the 'Medicine ball-throwing' test – boys (m)

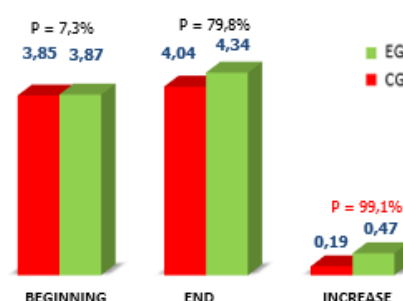


Fig. 9. Changes in the 'Medicine ball-throwing' test - girls (m)

Both groups' mean results showed no significant difference at the beginning of the experiment ($P = 3.2\%$). In the second test, the difference of $d = 0.44$ m was also insignificant ($P = 90.8\%$). The difference of 0.43 m between the increase in both groups was statistically significant ($P = 99.6\%$) and confirmed the effectiveness of the specific work performed through game exercises to develop the upper limbs' explosive power (Fig.8).

Girls also showed no significant difference between the groups before and after the experiment (Fig.9). The statistically significant difference between the increase in both groups ($d = 0.28$ m), which was confirmed by a guaranteed probability close to the maximum ($P = 99.1\%$), showed that the priority implementation of dynamics and specificity of the two sports under the experimental methodology positively impacted the girls' test results.

Football and volleyball are sports in which mainly the lower limbs are strained. Movement during play requires frequent direction changes depending on the ball, teammates, and opponents. Figures 10 and 11 illustrate the Standing Long Jump test results measuring the lower limbs' explosive power.

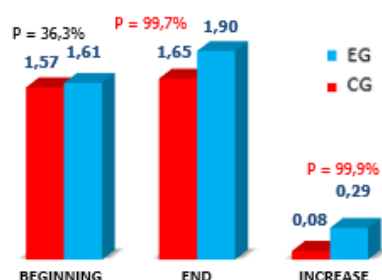


Fig. 10. Changes in the 'Standing Long Jump' test – boys (m)



Fig. 11. Changes in the 'Standing Long Jump' test – girls (m)

The insignificant difference in the first test ($d = 0.04$, $P = 36.3\%$) showed that the comparison of the methodology's effectiveness in boys is correct. The statistical significance of the difference in the second test ($d = 0.25$, $P = 99.7\%$) confirmed the effectiveness of the applied experimental methodology. The difference in the increase ($d = 0.21$ m), supported by a 99.9% guaranteed probability, proved the positive effect of the methodology. The emotional saturation of the games and the knowledge about the benefits of movement impacted the significantly better development of motor skills in the experimental group of boys.

Comparing the mean values of the two groups of girls before the experiment showed a statistically insignificant difference ($P = 62.8\%$). In the second test, the difference of 25cm in favor of the experimental group was reliable, with a guaranteed probability of ($P = 99.9\%$). The difference of 19 cm between the two increases ($P = 99.9\%$) also supported the applied advanced methodology.

Endurance often turns out to be a decisive factor in the positive outcome of a competition. Successful opposition to fatigue is achieved through result-oriented exercises, often associated with monotonous long-term activities that reduce interest and desire for active participation in a school environment. Emotionally charged games and game exercises included in the experimental methodology make students maintain a level of motor activity, improving their general endurance.

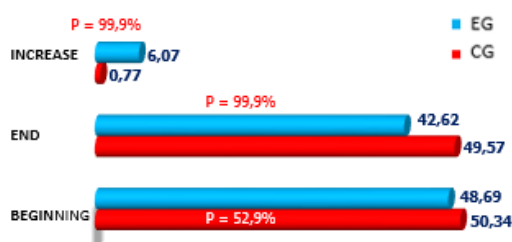


Fig. 12. Changes in the '200 m Running' test – boys (s)

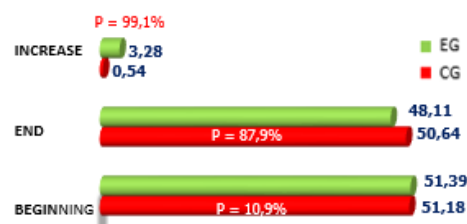


Fig. 13. Changes in the '200 m Running' test – girls (s)

At the beginning of the experiment, the boys of the two groups had close results, and the difference between them ($d = 1.65$ s) was insignificant ($P = 52.9\%$). At the end of the experiment, we found a significant difference in favor of the experimental group ($d = 6.95$ s), verified by a guaranteed probability close to the maximum ($P = 99.9\%$). The better results achieved by the experimental group by applying the advanced methodology were also confirmed by the significant difference in the increase ($d = 5.30$ s), supported by a guaranteed probability ($P = 99.9\%$) – Fig.12.

In the first test, the girls from the control group showed better results, but the difference ($d = 0.21$ s) was statistically insignificant ($P = 10.9\%$). In the second test, the difference ($d = 2.53$ s) was also insignificant ($P = 87.9\%$), but this time it favored the experimental group. We suppose that this insignificant difference obtained in the second test was due to the better results at the beginning of the experiment shown by the control group. The statistically significant difference of 2.74 s ($P = 99.9\%$) between the increases confirmed the effectiveness of the experimental methodology in improving overall endurance – Fig.13.

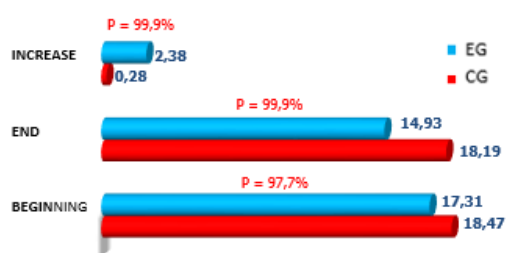


Fig. 14. Changes in the ‘T-test’ – boys (s)

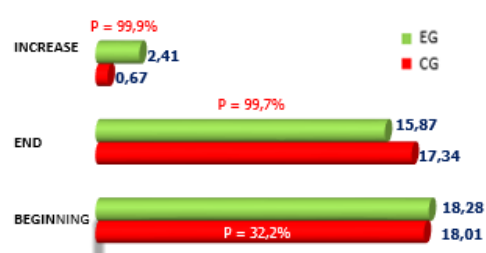


Fig. 15. Changes in the ‘T-test’ – girls (s)

The frequent change of situations in the games and the applied variable approach as part of the methodology used in the experimental group's training suggest the development of agility. The changes after the ‘T-test’ measuring the motor skill agility are presented in Figure 14 and Figure 15.

The boys' initial results on this test showed a statistically significant difference in favor of the experimental group ($d = 1.16$ s), contradicting the requirement of equality between groups. However, in our analysis, we must consider the increase in this difference at the end of the experiment ($d = 3.26$ s), which was also significant ($P = 99.9\%$). The difference in the obtained increase between the two groups was significant ($d = 2.10$ s, $P = 99.9\%$), indicating the effectiveness of games on agility improvement.

The advanced methodology also helped the girls from the experimental group to develop comprehensively their speed and coordination abilities. Before

the experiment, both groups showed close average results, with the control group demonstrating better achievements. After the training, we found a significant difference between the results ($d = 1.47$ s, $P = 99.7\%$), with the experimental group showing faster times. The hypothesis of the methodology's greater effectiveness with included game exercises applied to the experimental group was confirmed by the statistically significant difference between the increases ($d = 1.74$ s), supported by a guaranteed probability of 99.9%.

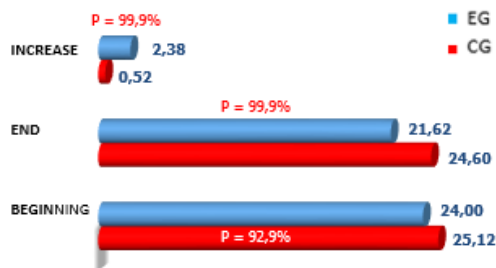


Fig. 16. Changes in the ‘Shuttle Run 72 m’ test – boys (s)



Fig. 17. Changes in the ‘Shuttle Run 72 m’ test – girls (s)

Learning technical elements through games and game exercises helps increase the students' active participation and build a sense of space, distance, and field dimensions. The Shuttle Run 72 m test was conducted on a standard volleyball court. The results are presented in Figure 16 and Figure 17.

The boys from both groups showed no significant difference in the results ($d = 1.12$ s, $P = 92.9\%$) in the first test. At the end of the experiment, the difference of 2.98 s was statistically significant ($P = 99.9\%$). The difference in the increase of the experimental and control groups was statistically significant ($d = 1.86$ s, $P = 99.9\%$). Performing the test on a volleyball court also favored the changes found. This was due to the repeatedly performed in-game specific moves on the field dimensions and the advanced spatial and visual orientation of the boys from the experimental group.

At the beginning of the experiment, the girls' results showed a slight difference in favor of the control group. The difference was already credible in the second test, and the better achievements favored the experimental group. The effectiveness of learning through games and movement with and without a ball applied to the experimental group was confirmed by comparing the increase in the results of the two groups. The difference of 2.30 s is statistically significant because it is supported with a guaranteed probability of 99.9%.

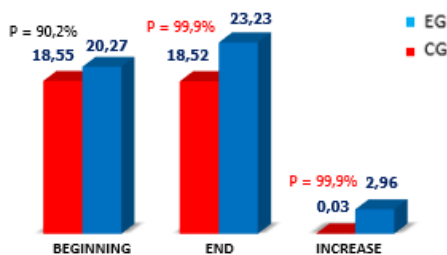


Fig. 18. Changes in the 'Sit-Ups' test – boys (reps per 30 s)

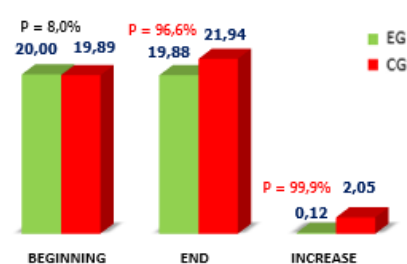


Fig. 19. Changes in the 'Sit-Ups' test – girls (reps per 30 s)

The comprehensive work in physical education and sport's lessons implies the development of the muscles of all parts of the body. The trunk muscles are closely related to the achievements in football and volleyball. We paid attention to this, and as a result of the applied exercises, we significantly improved the strength endurance of the students' abdominal muscles of the experimental group (Fig. 18 and Fig. 19).

The difference in the results between the two boys' groups ($d = 1.72$ reps) before the experiment was determined to be insignificant. Targeted strength development work as part of the tasks of our methodology led to a statistically significant difference ($d = 4.71$ reps, $P = 99.9\%$) in the second test. During the experiment, the control group did not realize an increase in achievement. The initial result of 18.55 n. was decreased by 0.03 numbers. The difference in the increases of the two groups ($d = 2.99$ reps), formed by the increase in the results from the experimental group and the decrease in the control group, was statistically significant ($P = 99.9\%$).

Like boys in the same test, the control group not only did not achieve a significant increase in achievement, but we found a decrease in the results by 0.12 reps. Under the influence of the methodology with widely practiced games, the experimental group significantly increased their achievements with an increase of 2.05 reps. The difference in the two increases was statistically significant ($d = 2.17$ reps, $P = 99.9\%$), confirming the experimental methodology's positive effect on developing the abdominal muscles' strength endurance.

The mobility of particular joints and overall work on flexibility improve results in a sport because they benefit other motor skills. Flexibility exercises are part of our methodology's tasks and content. Through the 'Standing Forward Bend' test, we measured the students' mobility in the hip joints and the spine (Fig. 20 and Fig. 21).

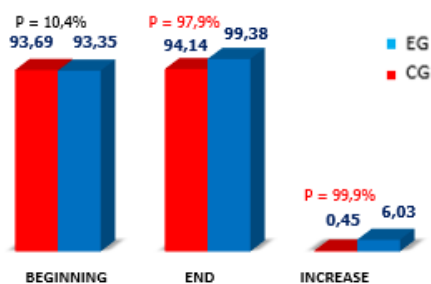


Fig. 20. Changes in the ‘Standing Forward Bend’ test – boys (cm)

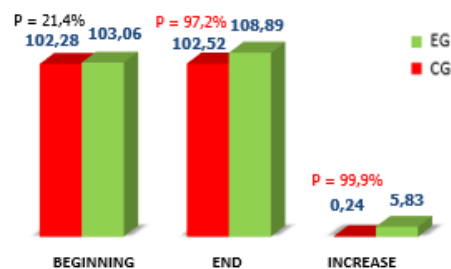


Fig. 21. Changes in the ‘Standing Forward Bend’ test – girls (cm)

The requirement of equality was met with the boys’ groups at the beginning of the experiment ($d = 0.34$ cm). At the end of the experiment, as a result of the training according to our proposed methodology, we revealed a statistically significant difference between the two groups ($d = 5.24$ cm, $P = 97.9\%$). The statistically significant difference between the increases of 5.58 cm ($P = 99.9\%$) confirmed the effectiveness of our methodology in improving flexibility.

The knowledge provided about the benefits of playing sports and the overall development of motor skills positively affected the girls from the experimental group as well.

The results from the first test showed no significant difference in the results of the two studied groups ($d = 0.78$ cm, $P = 21.4\%$). At the end of the experiment, a difference of 6.37 cm was supported with greater than 95% guaranteed probability ($P = 97.2\%$). The difference in the growth of the experimental and control groups was statistically significant ($d = 5.59$ cm, $P = 99.9\%$).

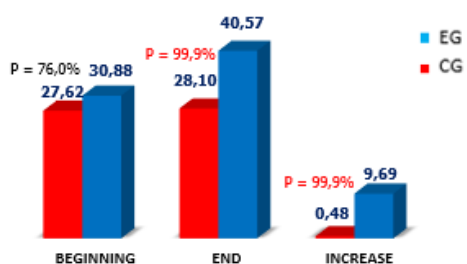


Fig. 22. Changes in the ‘Jump over obstacle’ test – boys (reps per 30 s)



Fig. 23. Changes in the ‘Jump over obstacle’ test – girls (reps per 30 s)

Jumping endurance is a specific endurance related to the specifics of the muscles’ work in different types of sports. Active participation in games, part of the experimental methodology, improves the ability to oppose specific fatigue.

Comparing the mean values of the two boys’ groups’ results before the training (Fig. 22) showed a statistically insignificant difference ($P = 76.0\%$). The

difference of 12.47 reps in the second test, favoring the experimental group, was reliable ($P = 99.9\%$). The statistically significant difference of 9.21 reps between the two increases ($P = 99.9\%$) supported the advantages of the applied advanced methodology.

Emotionally saturated games and game exercises included in the experimental methodology also helped girls from the experimental group to improve their jumping endurance (Fig. 23). At the beginning of the experiment, the results revealed an insignificant difference ($d = 0.13$ reps) in favor of the control group. The second test showed better achievements favoring the experimental group ($d = 5.42$ reps). The insignificant difference at the end of the experiment can be attributed to the initial indicators of the two groups. The effectiveness of learning through games and the frequent jumps and movements associated with handling the ball in modified games applied to the experimental group was confirmed by comparing the two groups. The difference of 5.55 reps was significant because it was supported by a guaranteed probability of $P = 99.8\%$.

The overall impact of the knowledge provided, purposeful work on the development of motor skills by performing the tasks of the lesson, as well as the active participation in games and game exercises, contribute to the achievement of better results related to the motor abilities of the experimental groups of boys and girls, in which the training was implemented with the methodology we have perfected.

III.3. Results analysis of the tests conducted to assess the students' technical abilities.

Building motor skills and habits, along with developing motor abilities, is the other central part of the learning process in physical education and sport classes. The level of technical training with the practical application of technical skills are criteria for the effectiveness of the work done in the lessons.

The analysis of the students' technical abilities in both sports will begin with the sports games' element, which the volleyball game starts with. The boys' results from both groups in the test 'Underhand service' are presented in Figure 24 and Figure 25.

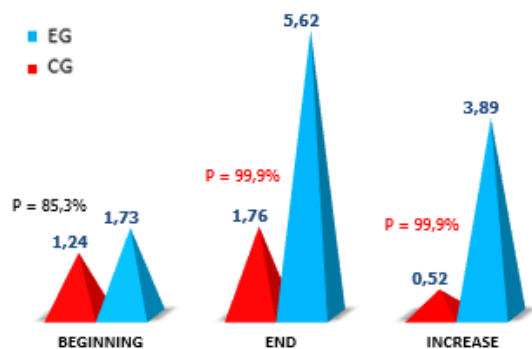


Fig. 24. Changes in the ‘Underhand service’ test – boys (nos)

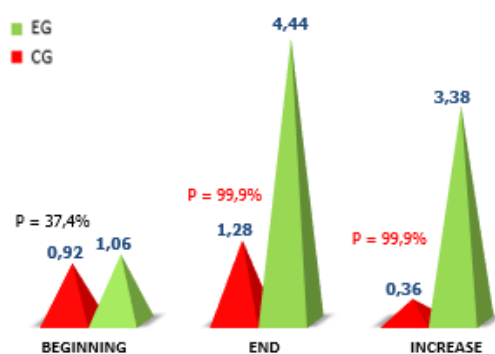


Fig. 25. Changes in the ‘Underhand service’ test – boys (nos)

Training in games through games contributed to building a sense for the ball. The number of successful services also increased due to its repeated application when the experimental group of students participated in modified games.

The difference in the results the boys showed before the training was statistically insignificant, meaning that the requirement of equality of groups was met. The difference revealed in the second test, favoring the experimental group ($d = 3.86$ nos, $P = 99.9\%$), confirmed the effect of the applied advanced methodology. The difference in increases ($d = 3.37$ nos) was supported by $P = 99.9\%$.

The girls’ two groups showed a statistically insignificant difference in their results in the first test. It reached 3.16 nos during the experiment, supported by a guaranteed probability ($P = 99.9\%$). The significant difference between the increases of 3.02 nos ($P = 99.9\%$) confirmed the effectiveness of the new methodology in improving the technical skills related to the execution of an underhand service at a target. Regularly applying ball game exercises and purposely working to improve students’ coordination positively affected other volleyball technical elements.

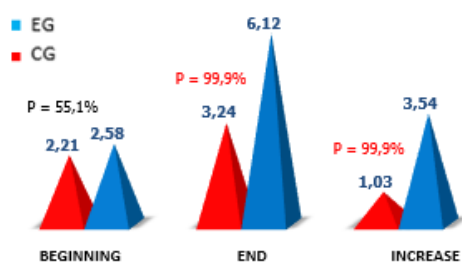


Fig. 26. Changes in the ‘Overhand pass’ test – boys (nos)

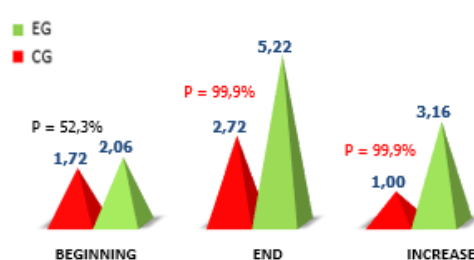


Fig. 27. Changes in the ‘Overhand pass’ test – girls (nos)

Before the experiment, the boys' two groups showed close results. Yet, the achievements of the experimental group were better (Fig. 26). After the training, we revealed a significant difference between the results ($d = 2.88$ nos, $P = 99.9\%$), with the experimental group again showing better performance. The statistically significant difference between the increases ($d = 2.51$ nos) was supported by a guaranteed probability of 99.9% and confirmed the hypothesis for greater methodology effectiveness with game exercises included in the experimental group.

Building and improving the technical elements in a game helps increase the students' active participation and build up a sense of space and distance. Testing on the volleyball court contributes to the better performance of the experimental group as a result of practicing in an actual playing environment.

Training in a random, dynamic, rapidly changing environment benefitted the volleyball technique of the girls from the experimental group (Fig. 27). In the first test, the results of the two groups were close. The resulting difference ($d = 0.34$ nos) was within the standard deviation. In the second test, a difference of 2.50 nos favoring the experimental group was obtained due to the conducted training. It was supported by a guaranteed probability ($P = 99.9\%$). Comparing the increases of the two groups indicated the difference in the effectiveness of the experimental and control impact. The resulting difference in favor of the experimental group of 2.16 nos was reliable ($P = 99.9\%$).

The advanced methodology also improved the results obtained from another main pass in volleyball – Underhand pass. The game's competitive element and the emotions generated in them contributed to the frequent, casual application of this element during modified games (Fig. 28 and Fig. 29).

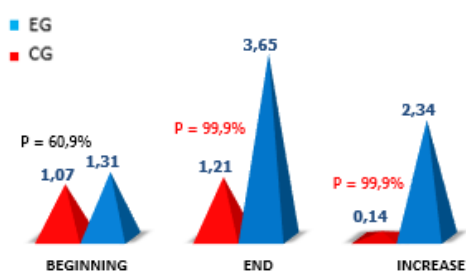


Fig. 28. Changes in the 'Underhand pass' test – boys (nos)

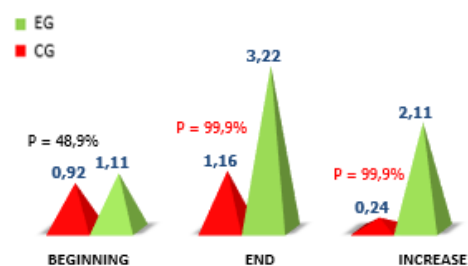


Fig. 29. Changes in the 'Underhand pass' test – girls (nos)

It can be seen that before training, the boys met the requirement of equality; there was no significant difference between the mean values of the two groups ($d = 0.24$ nos, $P = 60.9\%$). The significant difference in the second test in favor of the experimental group ($d = 2.44$ nos, $P = 99.9\%$) resulted from the tactical game

approach, part of the advanced methodology, in which skills were built during the game. The statistically significant difference between the two increases ($d = 2.20$ nos) confirmed the effectiveness of the experimental methodology ($P = 99.9\%$).

The girls from the two studied groups also showed insignificant differences in the results ($d = 0.19$ nos, $P = 48.9\%$) before the experiment. At the end of the experiment, the difference of 2.06 nos was supported by a guaranteed probability ($P = 99.9\%$). The statistically significant difference between the value increases in the two groups ($d = 1.87$ nos) was supported by a guaranteed probability ($P = 99.9\%$).

Variable or random training in football leads to the development of coordination abilities. Mastering technical skills in games and competitions helps build anticipation and feeling for a moving ball. The ‘Wall pass’ test (Fig. 30 and Fig. 31) measures precisely the speed of handling the ball for thirty seconds.

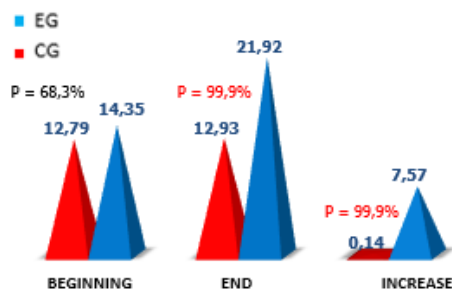


Fig. 30. Changes in the ‘Wall pass’ test – boys (reps for 30s)

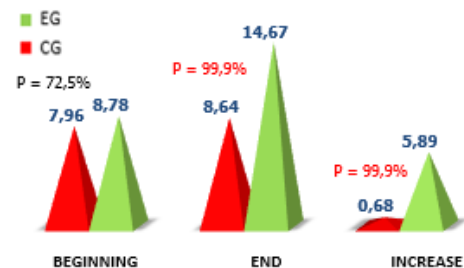


Fig. 31. Changes in the ‘Wall pass’ test – girls (reps for 30s)

Before the experiment, the boys from the two groups showed similar results from the Wall pass test ($d = 1.56$ reps, $P = 68.3\%$). At the end of the experiment, the difference in favor of the experimental group was significant ($d = 8.99$ reps, $P = 99.9\%$). The hypothesis of greater effectiveness of the advanced methodology was confirmed by comparing the increase of the two groups. A 99.9% guaranteed probability supported the difference ($d = 7.43$ reps). These results proved the positive effect of the experimental training, where, unlike the control one, the technique was built and refined in an actual game.

Girls also significantly improved their speed technique due to the training in games. Before the experiment, both groups’ results were close. The difference was statistically insignificant, with the experimental group demonstrating better achievements. After the experimental training, we revealed a statistically significant difference between the results ($d = 6.03$ reps, $P = 99.9\%$). The comparison of the increases in the groups once more confirmed the greater effectiveness of the applied to the experimental group training. The resulting

difference between them of 5.21 reps was supported by a guaranteed probability ($P = 99.9\%$).

Active participation in modified games using the dynamics and variability of game situations helps build a feeling for the ball, a significant indicator of technical preparation (Fig. 32 and Fig. 33).

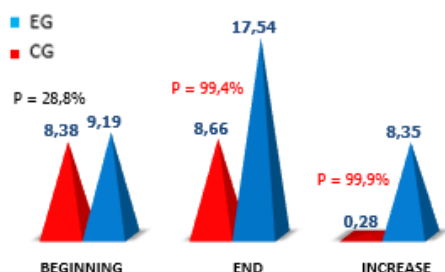


Fig. 32. Changes in the 'Juggling' test – boys (reps)

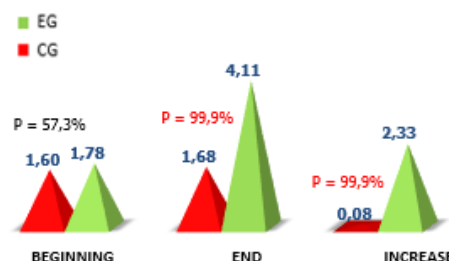


Fig. 33. Changes in the 'Juggling' test – girls (reps)

Boys from the two groups showed an insignificant difference in their results ($d = 0.81$ reps, $P = 28.8\%$) before the experiment. The second test showed a statistically significant difference in favor of the experimental group ($d = 8.88$ reps, $P = 99.4\%$), which confirmed the effectiveness of training through games as part of the applied advanced methodology. The effectiveness of the training through games and purposeful work to build a feeling for the ball used by the experimental group was confirmed by comparing the increases of the two groups. The difference of 8.07 reps was statistically significant.

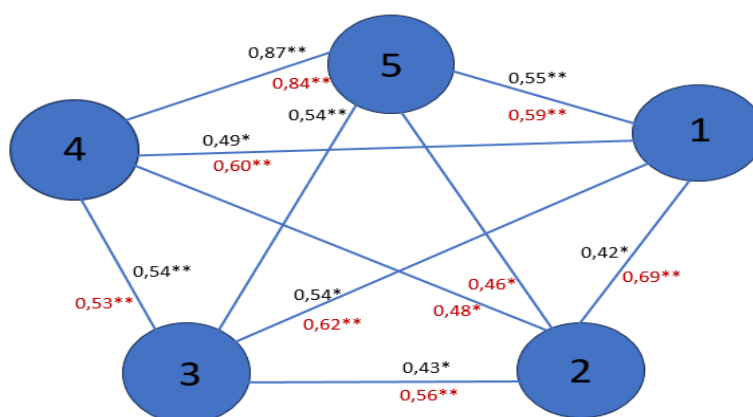
Girls in the experimental group also improved their football technical ability. The absence of a significant difference between the mean values in the first test ($d = 0.18$ reps, $P = 57.3\%$) confirmed the equality of the groups before training. At the end of the experiment, as a result of the conducted training, we found a significant difference in favor of the experimental group ($d = 2.43$ reps.) verified with a guaranteed probability ($P = 99.9\%$). The difference between the increases in each group ($d = 2.25$ reps), supported with a 99.9% guaranteed probability, proved the positive effect of the methodology.

The comprehensive influence of the game method, teaching in sports through games, tactical game approach, and building and improving skills in a variable, dynamic, and game environment had a positive impact on technical training.

III.4. Results from the correlation analysis of the data testing the experimental group's abilities.

The analysis of the quantitative changes that occur as a result of the training is not sufficient to achieve completeness and comprehensiveness regarding the students' physical and technical training. The matter should be considered from the point of view of the qualitative changes by studying the physical and technical indicators, as well as the interrelationships between them.

Key indicators for reporting the effectiveness of training in sports games are the technical skills developed. The correlation of the results showing the boys' experimental group's technical abilities in football and volleyball is presented in Figure 34.



Key:

1. 'Underhand service'; 2. 'Overhand pass'; 3. 'Underhand pass'; 4. 'Wall pass'; 5. 'Juggling'

Value at the beginning – $r = 0.00$; Value at the end – $r = 0.00$.

* - significance $\alpha = 0,05$; ** - significance $\alpha = 0,01$.

Fig. 34. Correlation model of the boys' experimental group's technical abilities

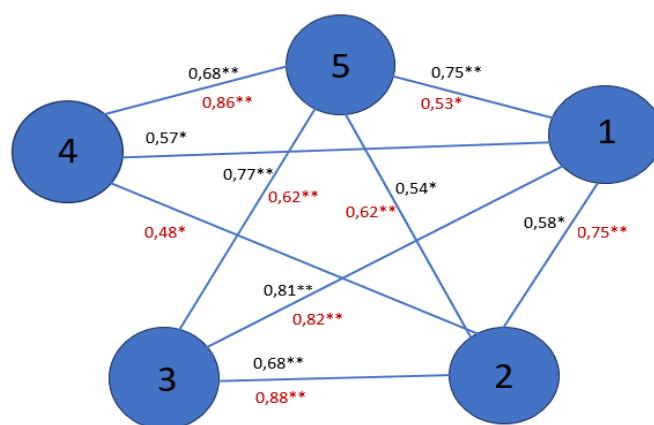
What made an impression before the training was the strong correlation between the two tests measuring football skills ($r = 0.87$, $\alpha = 0.01$). Four significant correlations were also revealed between the tests measuring the students' technical preparedness. There was no significant correlation between the Overhand pass test and the two football tests.

The correlations between the results in most tests measuring technical abilities in the boys' experimental group after the advanced methodology increased. There was no significant correlation between the Underhand pass test and the Juggling test. The increases in the strength of the correlation between the other technical abilities, however, showed moderate dependence between the Overhand pass and both football tests, which was missing before ($r = 0.48$, $\alpha =$

0.05; $r = 0.46$, $\alpha = 0,05$). The very strong dependence between Juggling and Wall pass tests ($r = 0.84$, $\alpha = 0.01$) remained the same, and at the same time, the significant correlations increased from four to six.

The correlation between elements in both sports became stronger, and the transfer of technical skills between them was reported due to the experimental methodology used by us, in which technical skills were built and perfected in games and technical abilities were comprehensively improved.

The correlation of the results showing the girls' experimental group's technical abilities in football and volleyball is presented in Figure 35.



Key:

1. 'Underhand service'; 2. 'Overhand pass'; 3. 'Underhand pass'; 4. 'Wall pass'; 5. 'Juggling'

Value at the beginning – $r = 0.00$; Value at the end – $r = 0.00$.

*** - significance $\alpha = 0,05$; ** - significance $\alpha = 0,01$.**

Fig. 35. Correlation model of the girls' experimental group's technical abilities

The correlation analysis of the technical abilities showed that before the training, there was no significant correlation between the Wall Pass test and the tests measuring the number of successful Under and Overhand Passes to a target. There were three strong correlations in the following tests: Underhand service, Underhand pass, and Juggling ($r = 0,81$, $\alpha = 0,01$; $r = 0,75$, $\alpha = 0,01$; $r = 0,77$, $\alpha = 0,01$).

The number of strong correlations increased from three to four. Two significant changes in the dependence between the technical elements of the two games due to the training made an impression. The correlation between the tests measuring the two volleyball passes changed from significant to strong ($r = 0.88$, $\alpha = 0.01$). The same happened with the correlation between the two tests measuring technical skills in football ($r = 0.86$, $\alpha = 0.01$). These results and interrelationships between technical skills can be attributed to the applied

experimental methodology. Building and improving technical ability naturally during a game develops both the individual technical element and contributes to the overall improvement of technique in the specific sport. The preserved number of significant relations and the increased correlation result from the overall impact of the methodology, leading to the transfer of skills between the two sports games.

III.5. Analysis of the results from the assessment of the abilities for playing a football and volleyball game.

To establish the students' ability to participate in a game, we developed assessment criteria for both sports based on the degree of successful use of the studied technical elements in a learning game.

Table 1

Criteria for Assessing Football Ability

Grade	Criteria
Poor 2	A student participates statically in the game, is not interested in the game, avoids contact with the ball, and does not know how to dribble, shoot, pass, and control the ball.
Sufficient 3	A student is static but attempts to contact and pass the ball without control. Attempts to tackle the ball from an opponent unsuccessfully can accurately pass the ball to a teammate when it does not move and does not attempt to dribble the ball.
Good 4	A student moves slowly in the field, uses one of the shots as a priority, regardless of the position of the ball, uses dribbling as well as kicking mainly with the right foot, has difficulty controlling the ball, and makes inaccurate passes and shots. A student is an active participant only in the defense phase or only in the attack phase.
Very Good 5	A student moves quickly and energetically on the field and successfully interacts with teammates. They try to combine ball control with passing and drive the ball with the dominant and non-dominant foot. They continue making passes and kicks, mainly with the dominant foot, and participate in the defense phase and the attack phase. They know how to control the ball and make accurate passes and shots.
Excellent 6	A student actively participates in the learning game and combines ball control with passing and striking. Passes and kicks are performed with the dominant and non-dominant foot. They know how to control the ball and make accurate passes and shots, even under challenging situations caused by the active resistance of one or several opponents, make correct and effective decisions about tricking an opponent and scoring a goal, and encourage, motivate, and support teammates.

Table 2

Criteria for Assessing Volleyball Ability

Grade	Criteria
Poor 2	A student participates statically in the game, is not interested in the game, avoids contact with the ball, and does not know how to pass and serve the ball.
Sufficient 3	A student is static but attempts to contact and make contact with a passing ball. Playing the ball with a volley pass is not successful. They fail to send the ball into the opponent's field from a service.
Good 4	A student moves slowly on the field and plays the ball with a volley pass directly into the opponent's court. They use mainly one of the passes, regardless of the height and speed of the ball, and successfully manage to send the ball over the net into the opponent's side of the court using a hand clenched into a fist.
Very Good 5	A student moves quickly and energetically on the field and hits the ball to the setter. They choose the appropriate element to hit the ball depending on its height and speed and successfully serve it with an open palm.
Excellent 6	A student actively participates in the learning game and plays difficult balls - low and high flying, at high speed, taking into account the size of the court and the possibility of hitting the ball on it. They encourage, motivate, and support teammates. They are proactive in their own and neighboring zones and make it difficult for the opponent to take over after service.

Table 1 illustrates the criteria for assessing abilities in the game of football, and Table 2 criteria for assessing them in the game of volleyball.

The created criteria served to apply expert assessment. Three experts, independent of each other, after the end of the pedagogical experiment, observed a learning game and assessed the technical skills of the students and their ability to participate in football and volleyball according to these criteria. The results obtained after the expert assessment were processed using frequency analysis.

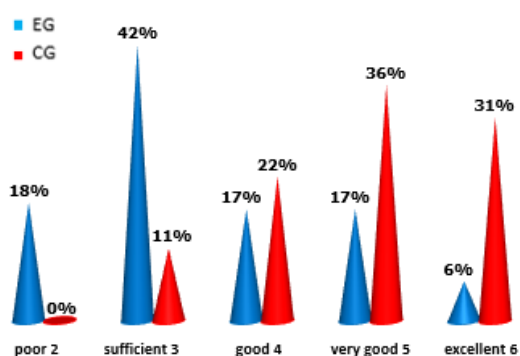


Fig. 36. Distribution of grades for technical playing skills - football (%)

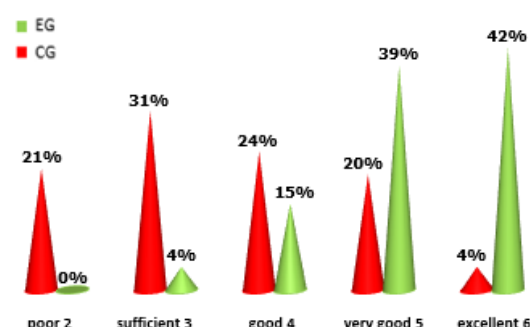


Fig. 37. Distribution of grades for technical playing skills - volleyball (%)

The results after the expert assessment of the football game (Fig. 36) subjected to frequency analysis showed that there were no poor grades among the football grades of the students from the experimental group. Over two-thirds of the students trained with the alternative methodology received very good and excellent grades, and over three-quarters of those taught using the standard methodology had poor, sufficient, and good grades.

The results after the expert assessment of the volleyball game subjected to frequency analysis showed a similar trend (Fig. 37). Again, there were no low grades in the experimental group. Over 80% of the students trained with the alternative methodology received very good and excellent grades, and over three-quarters of those trained using the standard methodology had poor, sufficient, and good grades.

We attribute the significantly better results in the experimental group to the applied advanced methodology, the training in a dynamic environment, and variable conditions.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS:

The study of the theory about the researched matter according to literary and documentary sources, the questionnaire conducted among PE teachers, the pedagogical experiment, and the analysis of the obtained results gave us a reason to draw the following conclusions:

1. Students' activity stimulation implies considering the peculiarities of the interrelated processes of education and teaching, the interaction between teaching and learning, and mastering adequate education content using an appropriate approach for the age characteristics of children's development.

2. Sports games are a priority content area for PE teachers, and volleyball and football are teachers' and students' top choice of games. At the same time, we found significant gaps in the teachers' theoretical training related to the teaching methods and the characteristics of the competency-based education approach.

3. The experimental groups' positive changes in students' motor abilities are due to the training conducted with the advanced methodology and the stimulation of motor activity by providing knowledge about the benefits of playing sports and participating in emotionally saturated games.

4. The statistical processing and analysis of the tests' results for assessing the students' technical abilities showed that forming and improving technical skills in football and volleyball in variable game conditions were the basis of the improved technical skills in the students from the experimental groups and led to more effective and more adequate technique.

5. The advanced methodology comprehensively improved the physical and technical training and made the correlations between the motor abilities and the dependencies between the elements in the individual sports games stronger. It helped transfer technical skills between the two sports. Differentiation in the motor qualities manifestation at the expense of improved technique was considered.

6. The assessment of the abilities to participate in a football and volleyball game showed the positive impact of game exercises and the applied game method for the VI-grade students' practical mastering of the education content in football and volleyball.

RECOMMENDATIONS:

The following recommendations can be derived as a result of the research analysis:

1. The advanced football and volleyball methodology that we tested should be used in PE lessons to train junior high school students and, with certain modifications, be multiplied in the other stages of the education system.

2. When training students in football and volleyball, technical skills development and improvement should be carried out mainly in dynamic and variable conditions close to a game.

3. Development and experimentation of new teaching methods should continue stimulating students' motor activity through a positive impact on the inner side of the personality based on knowledge about the benefits of movement, positive emotions, needs, and motives, and building sustainable behavior towards leading a healthy lifestyle.

4. The revealed gaps in teachers' knowledge related to applying the methods and characteristics of the competency-based education approach gave us a reason to recommend improving their theoretical training.

SCIENTIFIC CONTRIBUTIONS:

1. The theory in football and volleyball training was enriched, and the strategy for applying the game method was improved, as well as students' motor activity was increased.

2. A new advanced football and volleyball methodology was created, the basis of which was knowledge, game exercises, and the development of higher skills in a variable game environment.

3. Criteria were developed for assessing students' football and volleyball skills during an educational game, which physical education teachers can apply.

DISSERTATION RELATED PUBLICATIONS

1. **Gruev, S. (2022).** Efficiency of sports games training for 12 and 13-year-old students, International Scientific Congress ‘Applied Sports Sciences’ 2-3 December 2022 Sofia, DOI: 10.37393/ICASS2022/125, Vol. 2 p. 324 – 329.
2. **Gruev, S. (2023).** Interdependence between technical skills in football and volleyball in 12-13-year-old students, Sport and Science, Vol. 1, 2, p. 86 – 96, Sofia.
3. **Gruev, S. (2023).** Study on the distinctive features in the teaching process among teachers in physical education and sport, Sport and Science, Vol. 1, 2, p. 97 – 108, Sofia.