

STUDENTS' THEORETICAL KNOWLEDGE IN THE FIELD OF PHYSICAL AND HEALTH EDUCATION, AS WELL TEAM AND INDIVIDUAL SPORTS

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ABSTRACT

The organization of teaching activities in a modern secondary school implies the ability of students to acquire theoretical knowledge, transfer it to new educational situations and apply it in practice. One of the priority tasks of teaching physical and health education is to expand students' knowledge. In addition to sports and technical knowledge, theoretical knowledge helps students understand the importance of physical culture and relate to it correctly. It can be an incentive for students' activity in physical and health education classes. In order to emphasize their importance, the authors of this paper deal with the level of theoretical knowledge of secondary school students in the field of physical and health education, as well team and individual sports.

The aim of the research was to determine any statistically significant differences in educational achievements (levels of theoretical knowledge) in physical and health education classes among secondary school students, in relation to differences in planning and implementation of program content (continuous implementation during the school year and standard implementation in cycles).

The level of theoretical knowledge of students in the field of physical and health education and exercise was determined by a special knowledge test. The values of the multivariate analysis indicate a statistically significant difference between the experimental and control groups of respondents in the levels of their theoretical knowledge. It was confirmed that the higher level of knowledge was achieved by the respondents of the experimental group, in which the program content was implemented continuously, in contrast to the control group of respondents in which the program content was implemented in cycles.

Key words

individual sports, physical and health education, secondary school students, teaching activities, team sport, theoretical knowledge.

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Introduction

Rapid changes in all segments of human life require constant renewal and addition of knowledge, in the process of lifelong learning, aligned with the age and individual characteristics and capabilities of students. Lifetime represents a time for permanent learning and acquiring knowledge, and the educational process must be viewed holistically in all its individuality in relation to each student (Nenadić, 2006). What kind of knowledge is this? First of all, it is utilitarian knowledge, which is applicable in practice and which students gradually adopt.

The specifics of teaching physical and health education are determined by program tasks, which the teacher implements with students, with the aim of “satisfying the basic biopsychosocial needs of students in the field of physical culture, forming a correct understanding and attitude towards physical culture and permanently encouraging students to incorporate activities in it into everyday life and the culture of living” (*Pravilnik o planu obrazovanja...*, 2022: 127).

This goal is systematically achieved through the following tasks of physical and health education: (1) qualitative and quantitative deepening of physical abilities and sports and motor education, begun at earlier levels of education; (2) training students with independent work and self-control in maintaining physical fitness, strengthening health and caring for the body; (3) creating conditions in which student experiences the joy of free creative engagement in sports and recreational activities; (4) *expanding knowledge that contributes to an objective perception of the values and possibilities of physical culture*; (5) cultivating hygienic and other cultural habits for the preservation and strengthening of health. The above tasks are achieved in all secondary schools in Serbia, gymnasiums and secondary vocational schools.

Expanding knowledge that contributes to an objective perception of the values and possibilities of physical culture is a task that in physical and health education teaching implies the adoption of theoretical content in the system of continuous exercise and physical activity of students. Although this task is clearly determined in the curriculum, the question arises as to how much it is implemented in educational activities with students. Unfortunately, in the literature, a modest number of scientific works whose subject of research is the theoretical knowledge of students in the field of physical and health education, as well as in team and individual sports.

It is clear that the basis of physical and health education is the specific (more specialized) education of students through physical exercise, and teaching methods and procedures determine the level of physical education, the quality of knowledge and development of students, which in a certain sense also implies their transformation (Višnjić, Martinović, Ilić, Marković, 2010). The aforementioned transformations imply the development of the individual in all aspects. Therefore, physical and health education implies a system of influences that determine the development of a child in

all aspects (cognitive, socio-emotional, moral...), from the appearance of the first rudimentary movement abilities in children up to two years of age, to the improvement of specific abilities of primary and secondary school students (Kamenov, 1999). Perceptual-motor abilities, affective and cognitive development evolve together and a positive correlation has been proven between the motor activity of an individual and the level of his cognitive abilities (Sallis, McKenzie, Kolod, Lewis, Marshall, Rosengard, 1999). Certainly, these findings confirm the importance of educational activities and teaching physical and health education.

Theoretical knowledge, that students acquire in the process of physical exercise, determines the quality of their achievements, contributes to the expansion of knowledge and an objective perception of the values and possibilities of physical culture of every person, which is one of the priority tasks of physical and health education teachers in primary and secondary school (Hannon & Thompson, 2012; Maksimović, 2000; Marković, 2006; Marković & Bogdanović, 2010; Radisavljević Janjić, Janus Milovanović, Milanović, 2018).

In the teaching process, the teacher is the creator of planned and implemented activities, thereby contributing to the training of students to independently and continuously use the possibility of organized physical activities, with the aim of high-quality development of their overall potential. In order for this goal to be achieved, in educational activities, through teaching physical and health education, the student must acquire the following theoretical knowledge: knowledge about the subject; knowledge about the subject; knowledge about the influence of the subject on the subject; knowledge about the exploitation of the subject in terms of improving and enriching the subject and knowledge about the activities provided by the subject (Acković, 1975; Haslem, Wilkinson, Prusak, Christensen, Pennington, 2014).

Various organizational forms of teaching activities, such as physical exercise classes of a theoretical character, practical exercise classes during which theoretical knowledge will also be provided, homework in physical and health education, and popular lectures, contribute to students acquiring this knowledge. Quality theoretical knowledge of students in the field of physical and health education implies applicable knowledge, which will help them understand the essence and importance of the process of permanent physical exercise, appropriate to their age and individual capabilities (Kovač, Leskošek, Jurak, 2012). Such knowledge also determines the quality of the formed attitudes of children and young people about their attitude towards physical and health education classes and their (subject or object) position in the educational process (Stanojević, 1986).

In order to highlight the importance of teaching activities for the acquisition of high-quality theoretical knowledge by students in the field of physical and health education, and to point out the need for a more comprehensive view of the possibilities of realizing the aforementioned educational task, which involves expanding knowledge and objectively considering the values and possibilities of physical culture and physical exercise, the theoretical knowledge of secondary school students in the field of physical and health education and exercise in teaching activities was

investigated. Research goal was to determine any statistically significant differences in educational achievements (levels of theoretical knowledge) in physical and health education teaching among secondary school students, in relation to differences in planning and implementation of program content (continuous implementation during the school year and standard implementation in cycles).

Method

The research is longitudinally experimental in nature (pedagogical experiment with parallel groups of high school students), implemented in the 2023/2024 school year for one school year, in which physical and health education classes were organized through 60 school classes.

The initial assessment determined the level of theoretical knowledge acquired by these students at primary school age, with the aim of using a pedagogical experiment to raise the level of students' theoretical knowledge of physical and health education, as well as in team and individual sports. The research was conducted by teachers in physical and health education classes with the consent of school principals.

Respondent sample. The sample included 208 high school age respondents, who were divided into two characteristic subsamples in relation to the way of implementing the program content of physical and health education classes, and that on a subsample of 104 respondents from the experimental group, the Agricultural and Veterinary School in Svilajnac, who implemented the program content continuously, and a control group of 104 respondents from the High School "Svilajnac", who implemented the program content in cycles.

Experimental treatment. The control group worked according to the standard (classical) curriculum of the physical and health education, where professors implemented teaching content in cycles. The same teaching content was implemented with the students in the experimental group, but they were not planned and implemented cyclically, but continuously, throughout the entire school year. The experimental group worked during the planned 60 of classes, according to the following organizational system: one class of optional ball sports (handball), one class of athletics, one class of handball, then athletics and so on until the cycle of fifteen classes of athletics was completed. Then handball was implemented with gymnastics classes according to the same principle, one class of handball, one class of gymnastics, in continuity until the cycle of fifteen classes of gymnastics was completed. In this way, the sports game of handball was organized with the students throughout the school year, they repeated and mastered the elements of this activity, in accordance with the curriculum they expanded and deepened their technical and tactical preparedness for this sports game. In the control group, the teachers implemented the program contents of handball with the students in only one cycle, followed by the cycle of athletics, then

gymnastics and so on, in order, until the full implementation of the curriculum, until the end of the school year.

Student knowledge in physical and health education is the result of learning, it implies objective awareness of students about various subjects, phenomena and processes, knowledge of facts, principles and laws, thereby contributing to the development of a system of knowledge and values.

Research instrument. For the purposes of the research, a knowledge test was prepared, which aimed to provide a comprehensive overview of the level of their general knowledge about physical and health education, as well as in team and individual sports. Twenty questions were grouped into three thematic areas: knowledge about teaching physical and health education, knowledge about team sports, and knowledge about individual sports.

Knowledge about teaching physical and health education and knowledge about individual sports were determined at five levels (modalities): fail, pass, good, very good, and excellent. The assessment of new knowledge about team sports was carried out at four levels (modalities): fail, pass, good, and excellent.

Tasks for students were defined in the form of questions with alternative answers offered. The number of points earned for each question was determined for each respondent, as well as the total test score. In order to determine the validity of the test, a pilot study was conducted on a sample of 178 first and second grade high school students.

For a rough assessment of the factor validity of this instrument (knowledge test), on the complete sample, factor analysis using the principal components method was applied, with Varimax solution of the rotation of the principal components. Factor analysis extracted nine principal components, whose characteristic roots (Eigenvalue) were greater than one (1). The same matrix structure was retained after the rotation of the principal components, which shows that the final parsimony was achieved, i.e., that the test has a stable factor structure. The extracted factors are relatively evenly saturated.

Statistical data processing. The obtained data were processed in numerical and percentage representation. In order to investigate the significance of the differences in the achievements of the respondents (level of theoretical knowledge) of the experimental and control group, the following statistical procedures were applied: multivariate analysis of variance and Roy's test.

Research results with discussion

Level of students' theoretical knowledge about physical and health education.
 Data of the initial assessment indicate that the majority of the experimental group respondents achieved fail (22.10%) and good (22.10%) success, while the achievements of the control group respondents are mostly in the categories of fail (26.90%) and very good (25.00%) success.

Regardless of which group of respondents we are talking about, the initial assessment indicates an insufficient level (fail) of theoretical knowledge of the respondents in the field of physical and health education (*Table 1*).

Table 1. Numerical (N) and percentage (%) representation of grades in relation to the level of theoretical knowledge (about physical and health education), in the experimental and control group of respondents at the initial and final assessment

		Respondents' grades (success)									
Initial assessment		Fail		Pass		Good		Very good		Excellent	
Groups		N	%	N	%	N	%	N	%	N	%
Experimental		23	22.10	21	20.20	23	22.10	22	21.20	15	14.40
Control		28	26.90	18	17.30	18	17.30	26	25.00	14	13.50
Final assessment		Fail		Pass		Good		Very good		Excellent	
Groups		N	%	N	%	N	%	N	%	N	%
Experimental		8	7.70	10	9.60	21	20.20	37	35.60	28	26.90*
Control		24	23.10*	15	14.40	20	19.20	27	26.00	18	17.30

Legend: N – numerical representation of respondents with a certain success (level of knowledge); % – percentage of respondents with a certain success (level of knowledge)

After the initial assessment, in the control group of respondents, teaching was still implemented cyclically, while the teaching content with the experimental group respondents was implemented continuously. After 60 school lessons organized in this way, a final assessment of the level of theoretical knowledge of the respondents of both groups was carried out. In the experimental group, the largest number of respondents achieved very good success (35.6%), which is, compared to the initial assessment, increase of 14.40%. These data indicate that the level of theoretical

knowledge of the respondents has increased. This finding is supported by the fact that the number of respondents with excellent success is also higher on the final assessment (by 12.50%), while the number of respondents with fail and pass success decreased significantly (from 22.10% to 7.70% of respondents with fail success and from 20.20% to 9.60% of respondents with pass success).

In the control group, even after the final assessment, the largest number of respondents achieved very good success, with a percentage increase in this category of only 1% (from 25.00% to 26.00%). There were no major differences in the achievements of these respondents at other levels either, compared to the initial assessment. The number of respondents with fail success decreased by 3.80%. The number of respondents with pass success also decreased, by 2.90%, while the number of respondents with good success increased slightly (by 1.90%), as did the number of excellent respondents (by 3.80%). In contrast to the results of the respondents in the control group, the achievements of the respondents in the experimental group (at the final assessment) confirm a higher level of acquired knowledge. It can be assumed that continuous planning and implementation of educational content in physical and health education classes resulted in better results (positive effects) among the respondents, compared to cyclical planning and implementation of the same content, in the control group.

Students' theoretical knowledge about team sports. In the context of theoretical knowledge of secondary school students in physical and health education classes, the aim was to determine the level of their knowledge about team sports (Table 2). Based on the obtained parameters, it can be seen that on the initial assessment, in the experimental and control group, the most common student grades are excellent. This is an indicator that the respondents from both groups have a high level of knowledge about team sports, which can be interpreted by the high level of interest of students in these contents, their engagement in sports clubs, then the good representation of team sports in most physical education and health education classes, transparent and high achievements and good results of our athletes (national team of the Republic of Serbia) at European and world competitions in team sports (volleyball, basketball, water polo).

Table 2. Numerical (N) and percentage (%) representation of grades in relation to the level of theoretical knowledge (about team sports), in the experimental and control group of respondents at the initial and final assessment

Initial assessment	Respondents' grades (success)							
	Fail		Pass		Good		Excellent	
Groups	N	%	N	%	N	%	N	%
Experimental	13	12.50	14	13.50	12	1.50	65	62.50*
Control	31	29.80*	18	17.30	15	4.40	40	38.50

Final assessment	Fail		Pass		Good		Very good		Excellent	
	N	%	N	%	N	%	N	%	N	%
Experimental	1	1.00	7	6.70	12	11.50	41	39.40*	43	41.30*
Control	18	17.30*	25	24.00*	21	20.20*	24	23.10	16	15.40

According to the initial assessment, 74.00% of students from the experimental group achieved good and excellent success in this part of the test, while in the control group this percentage was 52.90% of students. In the final assessment, there was an increase in knowledge about team sports in both groups of respondents. In the experimental group, in the excellent category, very good and good 92.20% of respondents, which is 18.20% more respondents, compared to the initial assessment. In the control group, 58.70% of respondents were in these categories, which indicates a significantly smaller increase (by 5.80%).

When it comes to the theoretical knowledge of the respondents about team sports, as well as in the situation when the level of students' theoretical knowledge about physical and health education and physical exercise was assessed, the assessments confirmed that by continuous planning and implementation of teaching content, the level of this knowledge can significantly be increased, compared to cyclical planning and implementation.

Students' theoretical knowledge about individual sports. The next question, to which we wanted to get an answer, was related to the level of theoretical knowledge of high school students in the field of individual sports (*Table 3*). At the initial assessment, the highest percentage of respondents from the experimental group achieved good and very good success (total 59.60%).

Their achievements in the final assessment were significantly better, which is confirmed by the fact that the number of respondents with excellent result increased by 15.40%, and the number of respondents with fail results reduced by 10.60%.

No major differences in the achievements of the initial and final assessment were noted at the respondents of the control group. In categories from fail to excellent success, they range from 1.00% to 5.80% in both assessments.

Number of respondents with excellent and very good success was smaller in the final assessment, compared to the initial one, by 4.80%, in favor of the respondents with good success. In the category of respondents with good success, at the final assessment, an increase of 5.80% was determined.

Significantly better achievements of the experimental group respondents, at the final assessment, indicate the positive effects of continuous planning and implementation of educational content in physical and health education classes, compared to cyclical planning and implementation.

Table 3. Numerical (N) and percentage (%) representation of grades in relation to the level of theoretical knowledge (about individual sports), in the experimental and control group of respondents at the initial and final assessment

Initial assessment	Respondents' grades (success)									
	Fail		Pass		Good		Very good		Excellent	
Groups	N	%	N	%	N	%	N	%	N	%
Experimental	13	12.50	18	17.30	33	31.70	29	27.90	11	10.60
Control	26	25.00*	19	18.30	29	27.90	20	19.20	10	9.60
Final assessment	Fail		Pass		Good		Very good		Excellent	
Groups	N	%	N	%	N	%	N	%	N	%
Experimental	2	1.90	17	16.30	31	29.80	27	26.00	27	26.00*
Control	27	26.00*	17	16.30	35	33.70	18	17.30	7	6.70

When comparing the determined level of theoretical knowledge of the respondents about team and individual sports, the general conclusion is that their knowledge about team sports is greater.

One of the factors responsible for this situation is largely inadequate material and spatial conditions for the implementation of teaching content in athletics and gymnastics, in a large number of primary and secondary schools (Marković, 2016).

The situation in primary and secondary schools is very colorful. Data that 56.25% of elementary and 48.39% of secondary schools have no hall, and curriculum of physical and health education is so conceptualized in that way that over 60% of the content related to implementation in closed sports objects, in which several classes have lessons at the same time.

The above indicates that curriculum of physical and health education will not be able to be realized, and students will not be in a situation to acquire big percentage of sports and technical knowledge, especially from exercises on equipment and on the ground, which is represented in the curriculum of physical and health education from the first grade of elementary school, to the third grade of secondary school.

Elementary and secondary schools in the largest volume are not equipped with space for athletics contents. Circular path of 200 m doesn't exist in 83.33% of elementary schools, and there is none in any secondary school. 79.17% of elementary and 74.19% of secondary schools don't have pit for jumps.

Situation is almost identical with shot put circle, where 85.42% of elementary and 87.10% of secondary schools do not have it. Facility equipment for physical education classes is one of the decisive factors for participation especially of women's population in physical and health education classes (Marković, 2017).

The attitude of teachers and students towards individual sports is also significant, given that there is greater interest in team sports. The transparency of individual sports is lower, and the number of respondents who practice athletics and gymnastics is also lower compared to the number of those who practice team sports.

The aforementioned findings can be determined as the reasons why the respondents, both at the initial and final assessment, achieved better success in the area of theoretical knowledge about team sports.

Significance of differences in the levels of theoretical knowledge of the respondents. Further data analysis showed the significance of the differences in the levels of theoretical knowledge of the respondents in the field of physical and health education, as well as in team and individual sports, between the experimental and control group of respondents, at the initial and final assessment (Table 4).

Table 4. The significance of the differences between the experimental and control group of respondents, at the initial and final assessment in relation to the level of theoretical knowledge in the field of physical and health education, as well as in team and individual sports

Analysis	n	F	p
MANOVA (init.)	3	5.997	.001
MANOVA (fin.)	3	28.054	.000

Legend: n – number of variables;
F – value of the F-test;
p – level of statistical significance.

Multivariate analysis of variance indicates a statistically significant difference between the experimental and control group of respondents at initial assessment with a statistical significance level of $p = .001$ and a final assessment with a statistical significance level of $p = .000$ in relation to the level of theoretical knowledge about physical and health education, as well as in team and individual sports (Table 4).

Table 5. The significance of the differences between the experimental and control group of respondents, at initial and final assessment, in relation to individual areas of theoretical knowledge level

Variables	χ	R	F	p	χ	R	F	p
Physical and health education classes	.090	.09	1.68	.193	.240	.24	13.3	.00
Team sports	.252	.26	14.89	.000	.420	.46	55.6	.00
Individual sports	.172	.17	6.39	.012	.381	.41	41.7	.00

Legend: χ – level of association with other groups;
 R – Roy's test;
 F – value of the F-test;
 p – level of statistical significance.

A statistically significant difference between the experimental and control group of respondents at the initial assessment exists in knowledge about individual sports with a statistical significance level of $p = .012$ and in knowledge about team sports with a statistical significance level of $p = .000$. A statistically significant difference between the groups was not found in knowledge about physical education and health education, which indicates that respondents from elementary schools came with a relatively similar level of this knowledge.

At the final assessment, there is a statistically significant difference between the experimental and control group for all three segments of knowledge, with a statistical significance level of $p = .000$. Statistically significant differences were found in favor of the experimental group of respondents (*Table 5*).

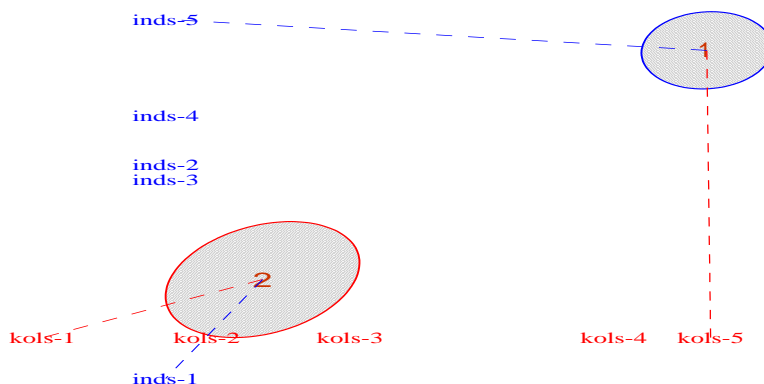
Table 6. Homogeneity of the experimental and control group of respondents at the initial and final assessment, in relation to the level of theoretical knowledge about physical and health education, as well as in team and individual sports

Groups	m/N	%
Experimental (init.)	68/104	65.38
Control (init.)	68/104	58.65
Experimental (fin.)	82/104	78.85
Control (fin.)	68/104	65.38

Legend: m – number of respondents with group characteristics;
 N – total number of respondents in the group.

The homogeneity of the respondents in the experimental group is higher and amounts to 65.38%. In the control group, on the other hand, 36 respondents have characteristics other than those of their group. The homogeneity is 58.65%. In the final assessment, the homogeneity increased in both groups, but the increase was greater in the experimental group.

These indicators support the conclusion that continuous planning and implementation of content in physical and health education classes contributed to better achievement of the respondents and their higher level of theoretical knowledge, compared to cyclical planning and implementation of the same content.



Legend: experimental (1); control (2); fail (kols-1); pass (kols-2); good (kols-3); very good (kols-4); excellent (kols-5); fail (inds-1); pass (inds-2); good (inds-3); very good (inds-4) and excellent (inds-5).

Chart 1. Ellipses (of confidence interval) of the experimental and control group of respondents at the final assessment, in relation to the state of knowledge about team sports and knowledge about individual sports

Looking at Chart 1, it can be seen that the abscissa represents knowledge about team sports (kols) with a five-point grading scale, and the ordinate represents knowledge about individual sports (inds), with a five-point grading scale.

In relation to the knowledge axis about team sports, the control group of respondents had the most fail grades, while the experimental group mostly had excellent knowledge.

In relation to the axis of knowledge about individual sports, the control group of respondents had the most fail grades, and the experimental group mostly had excellent knowledge.

For both categories of theoretical knowledge, the most common grade in the experimental group of respondents is five (excellent), and in the control group the grade is one (fail).

Final considerations

Obtained results indicate that the level of theoretical knowledge of secondary school students in the field of physical and health education, as well as in team and individual sports is determined by the planning and organization of teaching activities.

It has been established that it is possible to improve student success in this area by continuous planning and implementation of content in physical and health education classes, which points to a criticism of the usual cyclical planning and implementation of this class (meaning continuity/cyclicity in relation to sports disciplines that are studied through physical and health education classes).

The results of the research show that the respondents of the experimental group achieved better achievements in the final assessment, in all categories of theoretical knowledge about physical and health education, as well as in team and individual sports, whether it is general theoretical knowledge, knowledge about collective sports or knowledge about individual sports.

They achieved the best success in the category of theoretical knowledge about team sports, both in the experimental and control group, which indicates the fact that the level of their knowledge is not determined only by the way of planning and organizing physical and health education classes, but also by other factors, such as the interests of students, the affinities of teachers, the material and spatial conditions of the school, the influence of the media in informing and strengthening the level of aspiration among students, their engagement in sports activities and clubs outside of school.

The results of this research and these findings can represent a good starting base for new research in this area and beyond. It is believed that the lack of theoretical knowledge is one of the main factors causing insufficient physical activity among students (Keating, 2009).

The results obtained indicate that the experimental group participants significantly improved their success in the final assessment in all three categories of theoretical knowledge, in relation to the initial assessment.

Differences in the achievements of students from the control group, at both assessments, were not significant. Multivariate analysis of variance with a statistical significance level of $p = .000$, a statistically significant difference was found between

the experimental and control group of respondents at the final assessment, in relation to the level of theoretical knowledge about physical and health education, as well as in team and individual sports. Also, the Roy's test determined statistically significant differences between the experimental and control group of respondents at the final assessment, in all three areas of knowledge. At the initial assessment, a statistically significant difference in the knowledge of the respondents of the experimental and control group was not established. Statistically significant difference in the final assessment indicates a positive impact of the experimental treatment.

Based on the results obtained in the research and the differences in the educational achievements of the respondents, the general conclusion could be expressed as the following statement: the teaching of physical and health education, with continuous training and improvement of program content, with its positive effects caused a statistically significant increase in the level of theoretical knowledge of the respondents in the experimental group, and as such can be a reliable basis and recommendation for physical and health education teachers for the quality organization of educational activities.

This research allows for a more comprehensive view of the problem of adopting teaching content, then the actions of teachers in secondary schools in the direction of increasing the level of theoretical knowledge of students in the field of physical and health education, as well as in team and individual sports.

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