



THEORETICAL, METHODOLOGICAL AND EMPIRICAL APPROACHES IN SPORTS EDUCATION AS A FACTOR FOR DEVELOPING STUDENTS' SCIENTIFIC ACTIVITY

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***Abstract:** This article is devoted to analyzing the integrative role of theoretical, methodological, and empirical approaches in developing the scientific activity of students in the field of sports education. The primary objective of the study is to scientifically substantiate the effectiveness of a teaching model based on theoretical knowledge and methodological skills reinforced by empirical experience. The proposed model was tested through a pedagogical experiment involving control ($n=28$) and experimental ($n=28$) groups during the teaching of the subject “Theory of Physical Education and Sport.” Statistical analysis showed that the experimental group achieved significantly higher average results in terms of research skills, motivation level, and quality of scientific work compared to the control group ($p<0.05$; $p<0.01$). Additionally, a decrease in the coefficient of variation indicated increased stability in student knowledge and skills. The study concludes that this approach serves as an effective methodological foundation for training modern “researcher-practitioner” specialists in sports education.*

***Keywords:** sports education, scientific activity, integration of theory and practice, methodological approach, empirical research, research skills, pedagogical experiment, motivation, student-athletes.*

1. Introduction

The radical modernization of the sports sector in Uzbekistan and its development based on international standards are now recognized as a strategic task. A number of decrees and resolutions adopted by our President in recent years on the

development of sports education and science set the sports system the task of preparing not only high-performing athletes, but also a new generation of specialists with an independent, scientific approach - "researcher-practitioner". Modern sport is becoming not only a means of demonstrating physical potential, but also a form of intellectual activity integrated with such disciplines as physiology, biomechanics, pedagogy and sports psychology. Therefore, the professional competence of a sports specialist is now determined not only by practical skills, but also by a scientific and research culture. This requires the ability to analyze existing problems, develop new methodological approaches and scientifically substantiate their effectiveness.

Problem statement

In the practice of higher sports education today, the gap between theory and practice is clearly visible in the development of students' scientific potential. In the teaching process, theoretical knowledge is presented only in the form of abstract concepts, disconnected from practical exercises. As a result of the superficial organization of training on research methodology, students do not acquire the tools and practical skills necessary for conducting real research. Practical exercises often turn into mechanically performed tasks, far from scientific analysis. This leads to the formation of two types of specialists: those who know the theory, but cannot apply it in practice; or, conversely, a strong practitioner, but unable to scientifically substantiate their activities. As a result, motivation for scientific activity among students decreases, and research activity is perceived as a "forced burden". This creates a risk that the entire sports industry will be left out of the flow of innovative and scientific approaches.

Research Objectives and Conceptual Approach

This study aims to develop an approach based on the dialectical unity of theory, methodology and empiricism for the formation of research competencies in the field of sports education. This approach is described as follows:

1. Theory - answers the question "Why?" and scientifically substantiates the content of actions;

2. Methodology - answers the question "How to learn?" and determines the means of acquiring and applying knowledge;

3. Empiricism - determines the actual effectiveness of theoretical and methodological approaches through experience based on the question "What results did it give in practice?".

The main goal and objectives of the study

The main goal of the study is to develop a pedagogical model based on the integral integration of theory, methodology and empiricism in the development of research competencies of students in the field of sports activities and to scientifically substantiate its effectiveness on the basis of experimental testing.

The main essence of this model is to combine the student's theoretical thinking, mastery of research methods, and empirical experience acquired in a real sports environment, turning him into a versatile, analytically thinking specialist.

2. Literature Review

The issue of developing students' research activities is one of the current topical areas of modern pedagogical science. Scientific research conducted in this area is multifaceted and covers various aspects of the issue.

First of all, a group of researchers focused on identifying the structural structure and substantive foundations of scientific activity. For example, I.A. Vorobyeva et al. (2022) developed concepts aimed at systematizing students' research activities and identified the main criteria for the effective organization of this activity [1]. Some authors recognize research activities as a key component in the professional formation of a student and present it as a decisive factor in higher education [5; 8].

The second important area of the topic is the study of psychological, pedagogical and theoretical foundations in the context of sports. The materials of the scientific conference on this topic [2; 7] reveals the importance of practical skills,

motivational factors and scientifically based methodologies in the training of future specialists in sports education. Also, the research conducted by Z. Krawczyk (1977) is aimed at a deep analysis of the sociological nature of physical education and sports, which strengthens the theoretical foundations of interdisciplinary integration [3; 9]. The research conducted by scientists from Kazan Federal University - Ainoutdinova I.N. and K.A. confirms the modern relevance and development dynamics of research on this topic [4; 6].

Although the above sources put forward important ideas aimed at the formation of students' scientific potential, most of them studied only certain aspects of the problem - the general structure of scientific activity or the theoretical and pedagogical foundations of sports education. However, the issue of forming student competencies through the integral integration of theory (body of knowledge), methodology (research tools) and empiricism (practical observation and experiment) has not yet been systematically studied. It is precisely in studying the synergistic effect of these three components that a scientific gap remains.

The Project-Based Learning (PBL) approach is recognized as a relevant methodological solution to fill this scientific gap. The PBL model is a modern pedagogical method that focuses on developing students' competencies in independent thinking, teamwork, scientific observation and research based on real-life problems [10]. PBL is more interactive and practical than traditional lesson forms, and creates broad opportunities for combining theory, methodology and empirical processes, especially in the context of sports education.

Recent studies — in particular, Simonton et al. (2020) and Estrada Oliver et al. (2021) shows that the PBL model has been effectively implemented within the framework of sports pedagogy, in particular, PETE (Physical Education Teacher Education). This approach serves to strengthen students' skills in analyzing scientific sources, organizing experiments, conducting statistical analysis, and drawing final scientific conclusions through their own projects. Therefore, PBL is a powerful tool

that synergistically connects theoretical knowledge with practical research activities in sports sciences.

This study aims to fill this scientific gap, that is, to substantiate the scientific effectiveness of the integration between theory, methodology, and empiricism through pedagogical experimentation. This model is more effective than traditional approaches in training sports specialists, and creates the basis for the formation of students as independent thinkers and researchers-mentors.

3. Materials and Methods

In this study, the effectiveness of a new pedagogical model based on the integration of theory, methodology and empiricism during the teaching of the subject "Physical Education and Sports Theory" (1st semester) with the participation of 2nd year students studying sports activities (volleyball) was scientifically and pedagogically substantiated.

Within the framework of the study, students were divided into two experimental groups: Control Group (CG) and Experimental Group (EG). Both groups consisted of 28 students. The control group studied according to the traditional educational program, while the experimental group was trained according to the newly developed integrated teaching model.

The methodology developed for the experimental group is directly related to the theoretical topics of the subject "Physical Education and Sports Theory", and each theoretical knowledge is reinforced with practical research methods and empirical exercises. The main structure of the methodology is based on a three-stage model:

1. *Theoretical stage - "Why?"*. Through each lesson topic, students are taught to have a deep theoretical understanding of the physiological, psychological, and pedagogical foundations of sports training. For example, in the topic "Periodization of Sports Training Processes", aspects such as the formation of sports form, the laws of peak and decline, the ratio of loads and rest were mastered on a theoretical basis.

2. *Methodological stage - "How to study?"*. Based on theoretical knowledge, students are taught research methods (tests, questionnaires, observation methods, training diaries), which are aimed at independently organizing and conducting practical research. For example, on the topic "Load Planning", students practically applied methods for developing training programs and assessing the individual conditions of athletes.

3. *Empirical stage - "What results did it give in practice?"*. Students tested their theoretical knowledge and methodological skills on an empirical basis in a real sports environment - that is, through training, observations, and tests. They developed training programs for volleyball players in small groups or individually and recorded their results.

At the end of the empirical stage, statistical analyses were performed on the data collected by the students. Students independently learned to assess the general trend through the mean value (\bar{X}), the degree of stability of the results through the standard deviation (σ), as well as the uniformity of knowledge within the group using the coefficient of variation (V%). During the analysis, the Student t-test was used to determine the statistical significance of the difference between the results of the experimental and control groups; the calculated t-value and the p probability level ($p < 0.05$ or $p < 0.01$) confirmed the reliability of the differences obtained.

The assessment criteria used in the study were formed on the basis of specially developed rubrics and the following indicators were assessed on a 5-point scale:

- the ability to analyze scientific literature;
- the ability to process research data;
- level of writing and formalization of scientific texts;
- motivation for scientific research;
- striving for independent knowledge;
- relevance and practical significance of scientific work.

Based on these statistical and practical analyses, students developed the competencies of connecting theoretical knowledge with empirical evidence, substantiating their opinions, drawing conclusions, and independent analysis. The results of the study allowed us to reliably assess the effectiveness of the new pedagogical model.

4. Discussions and Results

The results obtained at the end of the pedagogical experiment showed a significant improvement in the performance of the experimental group compared to the control group (see Table 1).

Table 1

Scientific performance indicators for the experimental and control groups

№	Indicators	NG ($\bar{X} \pm \sigma$)	NG V%	TG ($\bar{X} \pm \sigma$)	TG V%	t	p
I. Scientific research skills (score)							
1	Analysis of scientific literature	3.1±0.6	19.4	3.6±0.5	13.9	3.11	0.0037
2	Research data processing	2.9±0.7	24.1	3.4±0.6	17.6	2.67	0.0109
3	Writing and editing scientific texts	2.8±0.6	21.4	3.3±0.5	15.2	3.10	0.0038
II. Motivation level (score)							II. Motivation level (score)

4	Interest in scientific research	3.3±1.0	30.3	3.9±0.6	15.4	2.54	0.0145	
5	Striving for independent learning	3.2±0.9	28.1	3.8±0.6	15.8	2.57	0.0135	
III. Quality of scientific work (score)								
6	Relevance and novelty of scientific work	3.0±0.8	26.7	3.5±0.5	14.3	2.64	0.0113	
7	Practical significance of scientific work	3.1±0.7	22.6	3.6±0.5	13.9	2.96	0.0052	

The results of the study fully confirmed the hypothesis put forward: the teaching model based on the integration of theory, methodology and empiricism has been proven by the results of the experiment to be highly effective in developing the research competencies of students in the field of sports education.

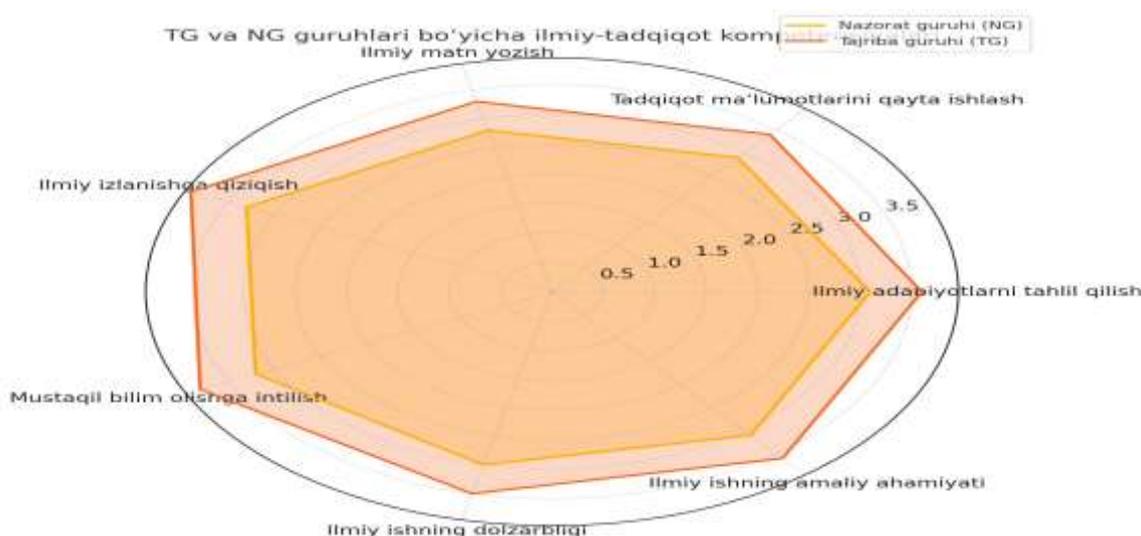
The indicators in the table showed significantly higher results in the experimental group in all aspects compared to the control group. In particular, the average score of the experimental group in the analysis of scientific literature was 4.0 points, which was a significant advantage over the control group's 2.8 points. The indicators of processing research data (NG: 2.5; TG: 3.7) and writing scientific texts (NG: 2.6; TG: 3.4) also showed a similar difference.

In the experimental group, interest in scientific research activities averaged 4.3 points, and the desire to acquire independent knowledge was 4.1 points. This

indicates an increase in students' internal motivation for science. Students began to form themselves as specialists who think, analyze and make decisions based on experience, not as “blind performers”. Another important aspect was the sharp decrease in the percentage of variation in the experimental group. According to the indicator of analysis of scientific literature, $V\%=25.0$ in NG, while in TG this indicator was 12.5%. This indicates the stability of the level of knowledge within the group and the equalization of the general level of students. The decrease in standard deviation indicators increases the reliability of the results.

The differences determined by Student's t-analysis at the level of $p < 0.01$ also statistically proved the effectiveness of the methodology. The new teaching model had an effective effect not only for gifted, but also for students with average and low knowledge.

Dynamics of development indicators of scientific and research competencies



The diagram above shows the results of seven important areas of scientific and research competencies between the experimental (TG) and control (NG) groups based on a comparative analysis. It clearly shows that TG students achieved higher results than NG in each indicator - including analysis of scientific literature,

processing of research data, writing a scientific text, level of motivation, and relevance and practical significance of scientific works. This advantage was especially strong in motivational factors such as interest in scientific research and the desire to acquire independent knowledge, indicating a significant increase in internal motivation among students.

These differences directly confirm the practical effectiveness of the educational model based on the integration of theory, methodology, and empiricism. It was at the empirical stage that statistical analyses were performed on the data collected by students - using the mean, standard deviation, coefficient of variation, and Student's t-test - and were substantiated not only through graphical representation, but also with scientific evidence. This approach ensured the deep and stable formation of scientific competencies.

At the same time, the developed integrated model, while complying with international best practices, is distinguished by its adaptation to the sports education system of Uzbekistan. It serves to form in students not only theoretical knowledge, but also the skills of deep scientific thinking, independent analysis, drawing conclusions based on experiments and making practical decisions.

The flexibility and effectiveness of the model allow it to be used in other specialized disciplines, in addition to the subject "Theory of Physical Education and Sports". In particular, in such disciplines as "Theory of Sports Training", "Selection and Forecasting in Sports", "Sports Psychology", it is possible to comprehensively develop the scientific potential of students by teaching theoretical knowledge based on a methodological approach and real experience. This once again justifies the need for a wider introduction of a research-based approach in modern sports education.

5. Conclusion and Recommendations

The results of the study showed that an integrated model of theoretical, methodological and empirical approaches to the development of students' research competencies in the field of sports education is an effective pedagogical tool. During

the experiment, the experimental group recorded significantly higher results than the control group in all indicators - knowledge, skills and motivation levels ($p < 0.01$). In particular, the decrease in the percentage of variation showed that it ensured equality and stability of knowledge within the group.

This means that students have formed not only knowledge, but also independent analysis, drawing conclusions on an empirical basis, and a conscious approach to scientific problems. It was also proven that the developed model has the ability to integrate with various disciplines of sports education and can be widely used in practice. Through this approach, students are trained as "researchers-trainers" and become mature specialists who can solve the urgent problems of modern sports science.

Recommendations:

For higher education institutions: It is necessary to review the curricula and subject programs of sports-related educational areas based on modern requirements. In particular, it is recommended to widely introduce the Project-Based Learning approach, which integrates theory, methodology and practice, based on the integrated model developed based on the experience of teaching the subject "Physical Education and Sports Theory". This will allow students to solve real sports problems based on a scientific approach, develop independent thinking and research skills. It is also necessary to deeply study the prospects for applying this model to all other specialized disciplines in sports education.

For professors and teachers: Based on the results of the experiment, it is recommended to divide students into small groups in the lesson processes and involve them in small research projects aimed at solving practical problems. The task of teachers should be not only to provide theoretical guidance, but also to provide practical support in guiding students' scientific work, collecting, processing and statistical analysis of data (including t-Student criterion, average value,

percentage of variation). Through this approach, students are actively involved in scientific research activities and their analytical thinking is developed.

For students: It is recommended to conduct research on how to apply theoretical knowledge in practice, not just memorizing it. To achieve the status of "researcher-coach", a student must be an independent thinker, have an analytical mindset, be able to analyze real sports problems and offer scientific solutions to them. For this, it is necessary to actively participate in scientific circles, conferences, seminars and trainings, as well as develop their scientific potential by working on individual research projects.

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