

DEVELOPMENT OF COORDINATION ABILITIES IN STUDENT VOLLEYBALL PLAYERS

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Abstract: The article examines the specific features of developing coordination abilities in university students engaged in volleyball training within the educational process. The relevance of the study is determined by the fact that coordination qualities serve as the foundation for the successful acquisition of volleyball techniques and tactics, influencing the accuracy and speed of motor actions, the stability of skills, and the effectiveness of game interactions. The paper presents the results of pedagogical observations and an experimental program aimed at enhancing coordination stability, movement accuracy, reaction speed, and the ability to rapidly switch between motor tasks. It is demonstrated that the use of coordination ladders, balls of varying weight and size, as well as jumping and game-based exercises, ensures a significant improvement in motor performance and contributes to the higher quality of executing volleyball-specific technical elements. The findings confirm the high effectiveness of the developed methodology and its practical significance for improving the system of physical education and the preparation of university volleyball teams.

Keywords: volleyball, students, coordination abilities, motor training, educational and training process, sensorimotor development.

Introduction. The development of coordination abilities is one of the key components in the preparation of university students engaged in volleyball within the educational process. Volleyball is a dynamic sport that requires high movement accuracy, rapid reaction speed, the ability to shift attention instantly, and the execution of complex technical and tactical actions under constantly changing game conditions [4, 7, 8]. Coordination abilities form the foundation of a volleyball player's motor culture, determining the successful performance of all technical elements-passing, receiving, attacking, blocking, court movement, and defensive actions [2, 5, 13].

Contemporary research indicates that coordination training is directly associated with the level of neuromuscular regulation, the plasticity of nervous processes, and the functional state of the sensory systems, particularly the visual, motor, and vestibular analyzers [1, 3, 11]. Coordination defines the quality of motor actions, the stability of skills under external disturbances, and the ability to adapt quickly to new game conditions. This is especially relevant in university sports, where many students lack prior specialized athletic training and demonstrate uneven development of coordination qualities [6, 9, 10].

As an academic discipline, volleyball possesses significant potential for developing coordination abilities due to the variety of motor tasks, the variability of game situations, high emotional engagement, and substantial motor density during training sessions. However, teaching practice shows that without targeted preparation, a considerable portion of students faces difficulties in mastering technical elements, such as insufficient precision of movements, delayed reactions, impaired balance, and lack of stability in motor skills [12, 14].

These problems are caused by several factors:

- an insufficient level of prior physical preparation;

- the absence of systematic influence aimed at developing coordination abilities;
- an instructional process focused mainly on competitive forms of activity;
- limited opportunities for individualizing training load within large academic groups;
- the predominance of mechanical exercise performance without an understanding of the orientational basis of movement.

In educational practice, there is often a discrepancy between the demands of volleyball as a coordination-intensive sport and the teaching methods used, which do not ensure the formation of basic skills of sensorimotor regulation, movement rhythmization, spatial-temporal accuracy, and motor adaptability. This lowers the effectiveness of training and increases the time required for the development of stable technical skills.

Methods. A comprehensive methodological approach was used in this study, including theoretical analysis, pedagogical observation, experimental work, and subsequent quantitative and qualitative assessment of the results. At the first stage, an analysis of scientific and methodological literature was conducted, focusing on the development of coordination abilities, the psychophysiological mechanisms of motor regulation, methods of teaching volleyball, and the specific features of student training in higher education [15, 16]. This made it possible to determine the main directions for influencing coordination qualities, identify the most effective means for their development, and outline methodological problems characteristic of traditional forms of instruction.

Throughout the academic year, systematic pedagogical observations were carried out during volleyball training sessions with student groups of varying skill levels. The observations were conducted according to pre-established criteria, which included movement accuracy, reaction speed to game-related stimuli, balance stability, ability to switch between motor tasks, typical errors in performing technical elements, and effectiveness of actions in game situations. This made it possible to identify common difficulties students experience when learning volleyball techniques and to determine their initial level of coordination preparedness.

Such an integrated methodological approach made it possible to thoroughly and comprehensively examine the process of developing coordination abilities in student volleyball players and to determine the effectiveness of the experimental program aimed at improving the quality of their motor and technical preparedness.

Results. The conducted study revealed significant changes in the level of coordination abilities among student volleyball players following the implementation of the experimental program. Initial testing confirmed that most students demonstrated insufficient indicators of movement accuracy, balance stability, motor reaction speed, and the ability to quickly switch between motor tasks. During the performance of volleyball technical elements, a large number of typical errors were recorded, including inaccurate passes, delayed reactions to the ball's trajectory, disruptions in movement rhythm and tempo, difficulties in performing spatially constrained movements, and reduced precision of hitting actions.

After introducing the exercise program aimed at developing coordination, students in the experimental group showed pronounced positive improvements. The repeated testing indicated enhanced accuracy of passes and throws, increased reaction speed to visual and auditory stimuli, improved balance stability, as well as greater tempo and accuracy of spatial movements. Particularly noteworthy was the improvement in students' ability to adjust their motor actions under changing game conditions: they adapted more rapidly to unpredictable ball trajectories, positioned themselves more accurately on the court, and interacted more effectively with teammates.

Discussion. The results obtained in this study confirm that the development of coordination abilities is a key factor in the successful teaching of volleyball in higher education settings. The observed improvements in movement accuracy, reaction speed, and balance stability indicate that the specially designed coordination training program effectively influences the fundamental mechanisms of students' motor regulation. These findings align with contemporary scientific perspectives, which view coordination as a complex integrative quality dependent on the synchronized functioning of the motor analyzer, vestibular system, kinesthetic sensitivity, and the central nervous system.

Of particular importance is the fact that positive dynamics were observed not only in the tested coordination qualities but also in technical proficiency. This supports the widely accepted concept in sports pedagogy that technical volleyball skills cannot be fully developed without the prior formation of a solid coordination base. Improved passing accuracy, reduced errors in ball reception, and increased stability in attacking actions demonstrate the fundamental role that coordination skills play in mastering technique.

Significant improvements in students' ability to adapt to changing game conditions indicate an increase in motor flexibility and skill automatization. This is especially essential in volleyball, where the rapidly changing nature of gameplay requires instantaneous analysis and adjustment of motor actions. The findings are consistent with studies showing that complex exercises using coordination ladders, barriers, jumping drills, and balls of varying weight and size enhance the plasticity of motor programs and improve sensory integration processes.

The psychological dimension is also noteworthy: increases in students' confidence, initiative, and cognitive engagement demonstrate the motivational effect of coordination-oriented exercises and game-based elements. The emotional involvement inherent in game activities promotes more stable and conscious acquisition of motor skills. This supports the current pedagogical view emphasizing the necessity of emotionally stimulating exercises to enhance the effectiveness of teaching motor actions.

Overall, the study confirms that the implementation of a specialized coordination training program significantly improves technical performance, expands students' motor capacities, and contributes to the formation of stable and functionally integrated motor skills. This makes the proposed methodology a promising approach for practical application in university physical education and in the preparation of student volleyball teams.

Conclusion. The conducted study demonstrated that the targeted development of coordination abilities is a necessary and effective condition for improving the technical and motor preparedness of student volleyball players. The integration of varied exercises, sensorimotor stimulation tools, game-based methods, and specially selected coordination tasks into the training process ensures a significant increase in movement accuracy, reaction speed, balance stability, and the ability to dynamically switch between motor actions.

The results of the experimental work confirmed that coordination training serves as the foundation for the successful acquisition of volleyball technical elements, helping reduce the number of errors, enhance effectiveness in game situations, and accelerate the formation of stable motor skills. Furthermore, the use of game-based and highly variable exercises increases students' motivation, strengthens emotional engagement, and contributes to the development of a positive attitude toward physical activity.

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