



Current status of spiking technique of male students volleyball club of Tra Vinh University, Vietnam

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Abstract

Techniques in volleyball are a system of standardized, specialized movements aimed at optimizing performance and minimizing errors. Among them, the spiking technique plays a decisive role, serving as the main attacking option, directly contributing to scoring points and enhancing the team's tactical effectiveness. The purpose of the study is to evaluate the current state of spiking technique among male students of the Volleyball Club at Tra Vinh University, Vietnam. Using standard research methods in physical education and sports, such as document analysis, pedagogical observation, specialized and statistical mathematics tests. The research subjects are 20 male students from the Volleyball Club of Tra Vinh University and 20 lecturers, coaches, and professional staff. The research results have identified five tests and established standards for evaluating the spiking technique of male students in the volleyball club at Tra Vinh University. The evaluation results show that the state of the spiking technique of male students in the volleyball club at Tra Vinh University is classified as good in 35%, average in 45%, and poor and very poor in 20%.

Keywords: Spike, volleyball, students, tra vinh university, vietnam

Introduction

Volleyball is one of the five most widely practiced sports in the world [1]. Volleyball is one of the most popular competitive sports, widely taught in the physical education system at higher education institutions in Vietnam and around the world. Volleyball is a dynamic sport that requires high-level skills. Techniques in volleyball include serving, passing, setting, spiking, blocking, and defense [2], [3]. With its diverse movement characteristics and high demands on physical fitness, technique, and tactics, volleyball not only contributes to improving health but also comprehensively develops the motor skills of learners. (Fédération Internationale de Volleyball, 2021) [4].

In volleyball, the spike technique is one of the most difficult and demanding techniques. The athlete is required to jump and hit the ball with maximum force and high accuracy near the peak of the jump. Each spiking technique has its own unique movement pattern. According to Katsikadelli (1998) [5], spiking is the factor that has the greatest impact on a team's performance, accounting for the highest percentage of points in attacks. Indeed, the power spike is the most frequently used technique to score points and is an important offensive tool that has a decisive impact on the match outcome. In the technical structure of volleyball, the spike is identified as the primary attacking technique, playing a decisive role in scoring efficiency during matches [6], [7]. The study by Marcelino Rocha and colleagues (2010) [8] also indicates that the effectiveness of the smashing technique is closely related to match outcomes, especially in fast-attack and counter-attack situations.

The spiking technique is a specific skill in volleyball, consisting of a complex series of movements that require a high level of coordination and are characterized by several stages: approach, jump, a series of strong arm swings in the air, and landing phase [9], [10], [11]. According to G. D. Zetou

et al. (2008) [12], the effectiveness of this technique depends on the synchronized coordination of biomechanical factors such as jump force, arm swing speed, ball contact angle, and the ability to control the body in the air. In addition, the study by Forthomme Benoit *et al.* (2005) [13] demonstrated the relationship between swing speed and ball velocity after impact, thereby affirming the crucial role of technique in enhancing attack effectiveness.

Various modern approaches, such as 3D kinematic analysis, performance assessment, and the development of optimization models, have been implemented in research on smashing techniques worldwide. For example, the study by João Marcelino *et al.* (2014) [14] developed a system of indicators to evaluate the effectiveness of smashing in elite competitions. Additionally, Hugh McGown *et al.* (2001) [15], in the modern volleyball training literature, emphasize that spiking is a central technique in offensive tactics and should be prioritized in the training process.

In Vietnam, research on volleyball mainly focuses on high-performance athletes or high school students. Some notable works, such as those by Nguyễn Văn Hiếu (2015) [16] and Trần Đức Dũng (2018) [17] have addressed the spiking technique and its influencing factors. However, there remains a lack of in-depth studies of the student population in the sports club environment.

In the current context, extracurricular sports among students are increasingly popular, with volleyball among the most widely participated in sports. However, in practice, the technical level, especially the spiking technique of students, still has many limitations and does not meet the requirements of modern competition. This raises the need for research to assess the current technical status in order to provide a scientific basis for developing an appropriate training program.

Tra Vinh University is one of the educational institutions with a developed student volleyball movement. However, to

date, there has been no systematic research on the spiking technique of male students in the volleyball club. The lack of scientific data on the current state of techniques has affected the effectiveness of training and competition organization.

Based on the aforementioned theoretical and practical foundations, the selection of the topic: "Current Status of Spiking Technique of Male Students in the Volleyball Club at Tra Vinh University" is necessary and has clear scientific and practical significance. The research results will contribute to supplementing the theoretical foundation of the spiking technique in volleyball, while also providing scientific arguments for improving the quality of teaching, coaching, and developing the students' sports movement.

Research Method

1. Research subject

20 male students of Tra Vinh University Volleyball Club 20 lecturers, coaches, and specialized staff with extensive work experience and expertise in teaching and coaching volleyball.

2. Research method

The research uses the following method:

The method of document analysis and synthesis aims to:

Document reference method: aimed at collecting, synthesizing, and analyzing relevant information from various sources, the results help researchers build a theoretical foundation for studying volleyball techniques and spiking techniques in volleyball; it serves as a basis for selecting research methods and discussing research results.

Interview method: aimed at collecting information from lecturers, coaches, and experienced professional staff in teaching and training volleyball at Tra Vinh University

regarding the assessment test of spiking technique in volleyball for students of the Tra Vinh University Volleyball Club.

Statistical method: aimed at processing and analyzing the data collected during the research process with the support of SPSS 22.0 software.

Research Results

1. Selection of tests to evaluate the spiking technique of male students in the volleyball club at Tra Vinh University

Through the synthesis of relevant documents on the volleyball spike technique from research works by both domestic and international authors such as Nguyen Van Hieu (2015) ^[16], Tran Duc Dung (2018) ^[17], Ministry of Education and Training (2018) ^[18], Nguyen Van Hai (2016) ^[19], Tran Duc Phan (2014) ^[20], Le Quang Minh (2022) ^[21], Pham Thu Thu Ha (2023) ^[22], Oliveira, L. D. S., *et al.* (2020) ^[23]; Based on the research objectives and expert opinions, the study has selected 12 tests to evaluate the spiking technique of male students in the Volleyball Club at Tra Vinh University, including: Hit the ball into the designated position (20 times), Jumping height with a run (cm), Hitting the ball over the barrier (%), Hitting the ball against the wall for 30 seconds (times), Moving and hitting the ball continuously (times), Quick ball hits without a run-up (times), Jumping in place (cm), Ball hitting reflex (times), Lateral ball hitting movement (times), Hitting the ball into difficult areas (times), Continuous jumping for 10 seconds (times), Moving backward while hitting the ball (times).

Conduct the construction of a questionnaire and interview 20 lecturers, coaches, and volleyball specialists. The results are presented in Table 1.

Table 1: Results of the interview selecting the test to evaluate the spiking technique of male students in the Tra Vinh University Volleyball Club (n = 20)

	Test	Priority 1 (3 scores)	Priority 2 (2 scores)	Priority 3 (1 score)	Total score	%
1	Hit the ball into the designated position (20 times)	16 (48 scores)	3 (6 scores)	1 (1 score)	55	91.67
2	Jumping height with a run (cm)	15 (45 scores)	4 (8 scores)	1 (1 score)	54	90.00
3	Hitting the ball over the barrier (%)	17 (51 scores)	2 (4 scores)	1 (1 score)	56	93.33
4	Hitting the ball against the wall for 30 seconds (times),	16 (48 scores)	3 (6 scores)	1 (1 score)	55	91.67
5	Moving and hitting the ball continuously (times)	14 (42 scores)	4 (8 scores)	2(2 scores)	52	86.67
6	Quick ball hits without a run-up (times)	6 (18 scores)	7 (14 scores)	7 (7 scores)	39	65.00
7	Jumping in place (cm)	5 (15 scores)	8 (16 scores)	7 (7 scores)	38	63.33
8	Ball hitting reflex (times)	6 (18 scores)	6 (12 scores)	8 (8 scores)	38	63.33
9	Lateral ball hitting movement (times)	5 (15 scores)	7 (14 scores)	8 (8 scores)	37	61.67
10	Hitting the ball into difficult areas (times)	6 (18 scores)	5 (10 scores)	9 (9 scores)	37	61.67
11	Continuous jumping for 10 seconds (times)	4 (12 scores)	7 (14 scores)	9 (9 scores)	35	58.33
12	Moving backward while hitting the ball (times).	3 (9 scores)	8 (16 scores)	9 (9 scores)	34	56.67

Through Table 1, it is shown that five significant tests have been selected to evaluate the spiking technique of male students in the volleyball club at Tra Vinh University (the majority of opinions chose tests with scores of 80% or higher of the total score), including:

- Hit the ball into the designated position (20 times),
- Jumping height with a run (cm),
- Hitting the ball over the barrier (%),
- Hitting the ball against the wall for 30 seconds (times),
- Moving and hitting the ball continuously (times).

2. Developing technical classification standards for the spike technique of male students in the Tra Vinh University Volleyball Club

After selecting five tests with reliability and informative value, the study proceeded to establish classification standards for the spiking technique of male students in the Volleyball Club at Tra Vinh University.

The classification standard is developed based on the following criteria:

The actual inspection results of the research subjects through the five selected tests.

- Statistical mathematical methods (average value

$$\bar{X} = \frac{\sum_{i=1}^n X_i}{n}, \text{ standard deviation } S = \sqrt{\frac{\sum_{i=1}^n (X_i - \bar{X})^2}{n}}$$

- The principle of classification according to the standard score (sigma) is often used in sports research.
- Based on that, the study classifies the level of spiking into five levels:

- Very good:** $X \geq \bar{X} + 1S$
- Good:** $\bar{X} \leq X < \bar{X} + 1S$
- Average:** $\bar{X} - 1S \leq X < \bar{X}$
- Poor:** $\bar{X} - 2S \leq X < \bar{X} - 1S$
- Very poor:** $X < \bar{X} - 2S$

Building a classification standard table.

Based on the processing of data obtained from the experiment, the project proceeds to develop specific classification standards for each test.

Table 2: Standards for classifying the spiking technique of male students Trà Vinh University Volleyball Club

TT	Test	Very good	Good	Average	Poor
1	Hit the ball into the designated position (times)	≥ 16	13–15	10–12	7–9
2	Jumping height with a run (cm)	≥ 65	60–64	55–59	50–54
3	Hitting the ball over the barrier (%)	≥ 70	60–69	50–59	40–49
4	Hitting the ball against the wall for 30 seconds (times)	≥ 55	50–54	45–49	40–44
5	Moving and hitting the ball continuously (times).	≥ 20	17–19	14–16	11–13

3. Develop a scoring table to evaluate the spiking technique of male students in the volleyball club at Tra Vinh University.

Based on the classification standard system established in section 2.2, the study proceeded to develop a scoring table to evaluate the technical skills of the spiking in order to quantify the achievement level of each student via the selected tests.

Basis for constructing the grade table

The transcript is constructed based on the following criteria: Classification results according to five levels: Very Good, Good, Average, Poor, Very Poor

- Scoring principles in evaluating physical and technical sports performance
- Ensure objectivity, ease of use, and convenience in training practice.

Each level is converted into a corresponding score, reflecting the degree of completion of the ball striking technique of the trainee.

Grading principles

The conversion of points is carried out on a 10-point scale:

- Very good:** 9 – 10 scores
- Good:** 7 – 8 scores
- Average:** 5 – 6 scores
- Poor:** 3 – 4 scores
- Very Poor:** 1 – 2 scores

The score of each test can take an average value within a range or be specifically determined depending on the level of detail of the evaluation. Build a specific scoring table

Table 3: Scoreboard for evaluating the spiking technique of male students in the volleyball club at Tra Vinh University

TT	Nội dung test	Very Good (9–10)	Good (7–8)	Average (5–6)	Poor (3–4)	Very Poor(1–2)
1	Hit the ball into the designated position (times)	≥ 16	13–15	10–12	7–9	≤ 6
2	Jumping height with a run (cm)	≥ 65	60–64	55–59	50–54	≤ 49
3	Hitting the ball over the barrier (%)	≥ 70	60–69	50–59	40–49	≤ 39
4	Hitting the ball against the wall for 30 seconds (times)	≥ 55	50–54	45–49	40–44	≤ 39
5	Moving and hitting the ball continuously (times).	≥ 20	17–19	14–16	11–13	≤ 10

How to calculate the overall score

- The overall score of each student is calculated by the total score of the five tests.
- It can be converted to an average score using the formula:

$$\frac{\sum_{i=1}^5 X_i}{5}$$

Average score: $X = \frac{\sum_{i=1}^5 X_i}{5}$

Among them X_i is the score of each test

General proficiency classification

Based on the average score, the level of ball hitting is classified as follows:

- Very good:** ≥ 9.0 scores
- Good:** 7.0 – 8.9 scores
- Average:** 5.0 – 6.9 scores
- Poor:** 3.0 – 4.9 scores
- Very Poor:** < 3.0 scores

4. Assessment of the current state of spiking technique among male students at Tra Vinh University Volleyball Club

After establishing the testing system, classification standards, and evaluation score sheet, the research conducted an experimental test to assess the current state of spike technique among male students of the Volleyball Club at Tra Vinh University.

Organize an inspection

- **Subject:** Male students of the volleyball club (n = 20)
- **Test content:** the selected test year
- **Evaluation method:** Apply the scoring table and classification standards that have been developed.

Test results

Table 4: Results of the spike technique test of male students in the volleyball club at Tra Vinh University (n = 20)

	Test	X	S
1	Hit the ball into the designated position (times)	12.4	2.1
2	Jumping height with a run (cm)	57.3	4.5
3	Hitting the ball over the barrier (%)	54.6	6.2
4	Hitting the ball against the wall for 30 seconds (times)	47.8	3.9
5	Moving and hitting the ball continuously (times).	15.2	2.7

Overall classification

Based on the constructed score table, the classification results of the students' volleyball techniques are as follows:

Table 5: Classification of spike techniques of male students in the volleyball club (n = 20)

Level	Quantity	Percentage (%)
Very Good	2	10.0
Good	5	25.0
Average	9	45.0
Poor	3	15.0
Very Poor	1	5.0

The research results show

- The students' ball smashing technique is mainly at an average level (45%), accounting for the highest percentage. This reflects that the majority of students' smashing techniques are not yet stable, and their attacking effectiveness is still limited.
- The number of students achieving good and excellent levels accounts for 35%, indicating that there is a portion of students with relatively good skills, but they do not yet dominate.
- There are still 20% of students at a weak and poor level, this is the group that needs attention, supplementation, and adjustment of training methods.

Conclusion

The research results lead to the following conclusions: Identified 05 tests to evaluate the spiking technique of male students in the volleyball club at Tra Vinh University, including: Spiking to the designated position (times), Jumping with momentum (cm), Spiking over the block (%), Tapping the ball against the wall for 30s (times), and Continuous spiking while moving (times).

Establishing standards, including: score tables, classification tables, and a comprehensive classification for evaluating the spiking technique of male students in the volleyball club at Tra Vinh University.

The evaluation results show that the spike technique of male students in the volleyball club at Tra Vinh University is rated as good 35%, average 45%, and poor and very poor 20%.

References

1. Marcelino R, Mesquita I, Afonso J. The weight of terminal actions in volleyball. Contributions of the spike, serve and block for the teams' rankings in the

World League 2005. *Int J Perform Anal Sport*,2008;8:1-7.

2. Lenberg K. Volleyball skills & drills. Human Kinetics, 2006.

3. Pellett T. Skills, drills & strategies for volleyball. Routledge, 2017.

4. FIVB. Official Volleyball Rules 2021-2024. Fédération Internationale de Volleyball, 2021.

5. Katsikadelli A. Spike attack in volleyball: A comparative study between winners and losers of the Greek Championship. *Journal of Human Movement Studies*, 1998.

6. Singh AB, Rathore VS. Kinematic factors of off-speed and power spike techniques in volleyball, 2013.

7. Challoumas D, Artemiou A. Predictors of attack performance in high-level male volleyball players. *Int J Sports Physiol Perform*,2018;13:1-23.

8. Marcelino R, Mesquita I, Sampaio J. Efficacy of the volleyball game actions related to gender and skill level. *Journal of Human Kinetics*,2010;24:103-111.

9. Wagner H, Tilp M, Von Duvillard SP, *et al.* Kinematic analysis of volleyball spike jump. *Int J Sports Med*,2009;30:760-765.

10. Coleman SG, Benham AS, Northcott SR. A three-dimensional cinematographical analysis of the volleyball spike. *J Sports Sci*,1993;11: 295-302.

11. Marquez WQ, Masumura M, Ae M. Spike-landing motion of elite male volleyball players during official games. *Int J Sport Health Sci*,2011;9: 82-90.

12. Zetou E, Tsigilis N, Moustakidis A, Komninakidou A. Playing characteristics of men's Olympic Volleyball teams in complex II. *International Journal of Performance Analysis in Sport*, 2008;8(3):172-177.

13. Forthomme B, Croisier JL, Ciccarone G, Crielaard JM, Cloes M. Factors correlated with volleyball spike velocity. *American Journal of Sports Medicine*, 2005;33(10):1513-1519.

14. Marcelino J, Mesquita I, Afonso J. The weight of terminal actions in volleyball: Contributions of the spike. *Journal of Sports Science & Medicine*, 2014.

15. McGown C, Fronske H, Moser L. *Coaching Volleyball: Building a Winning Team*. Allyn & Bacon, 2001.

16. Nguyen Van Hieu. Nguyễn Văn Hiếu (2015). Research on attack techniques in volleyball. *Vietnam Journal of Sports Science*, 2015.

17. Tran Duc Dung. *Textbook on Volleyball*. Sports Publishing House, 2018.

18. Ministry of Education and Training. *Volleyball Textbook*, Vietnam Education Publishing House; 2018.

19. Nguyen Van Hai. *Techniques and Tactics of Modern Volleyball*, Sports Publishing House, 2016.

20. Tran Duc Phan. *Theory and Methods of Physical Education*, University Pedagogy Publishing House, 2014.

21. Le Quang Minh. Evaluation of the volleyball technical skills of students from universities in the southern region, *Journal of Physical Education Science*, 2022.

22. Pham Thi Thu Ha. Application of specialized exercises to enhance spiking efficiency in student volleyball, *Vietnam Sports Journal*, 2023.

23. Oliveira LDS, Moura TBMA, Rodacki ALF, Tilp M, Okazaki VHA. A systematic review of volleyball spike kinematics: Implications for practice and research. *International Journal of Sports Science & Coaching*,2020;15(2):239-255.