International Journal of Yoga, Physiotherapy and Physical Education
www.sportsjournal.in
E-ISSN: 2456-5067
Received: 11-09-2026, Accepted: 11-10-2026, Published: 26-10-2026
Volume 11, Issue 4, 2026, Page No. 91-95

Development of a training program to improve agility and coordination in the men's basketball team at Ho Chi Minh City University of Industry and Trade

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DOI: https://doi.org/10.66856/ijyppe.2026.11.4.11108

Abstract
Through the research process, the study selected 5 valid tests to assess the current status of agility and coordination performance for the Men's Basketball Team of Ho Chi Minh City University of Industry and Trade. Furthermore, the study identified 20 exercises and formulated a comprehensive training program designed to enhance the agility and coordination capacities of the Men's Basketball Team at Ho Chi Minh City University of Industry and Trade.

Keywords: Agility and coordination, basketball, Ho Chi Minh City University of Industry and Trade, male, training program

Introduction

In the developmental trend of modern sports, basketball demands extremely high exercise intensity, fast pace, and intense physical contact. To achieve high performance, alongside sophisticated technical and tactical skills, a robust physical conditioning foundation serves as the decisive bedrock governing an athlete's overall performance throughout a match. Within this physical fitness system, while strength provides explosiveness and endurance maintains continuous working capacity, agility and coordination are the key elements ensuring fluidity and effectiveness in every play.

In modern basketball, situations occurring in confined spaces require athletes to execute sudden changes of direction, make split-second anticipations, and handle the ball skillfully under tight defensive pressure. Agility and coordination not only assist players in successfully executing dribbling, bypassing opponents, shooting, or pressing defense, but also act as a crucial shield to minimize impact-induced injuries.

Practical coaching and competition experiences of the Men's Basketball Team at Ho Chi Minh City University of Industry and Trade (HUIT) indicate that despite considerable efforts, competitive performance remains suboptimal. One of the primary reasons is the athletes' limited motor coordination capacity, sudden change-of-direction ability, and dexterity during intense competitive contests. Therefore, researching, selecting, and applying a scientific exercise system to improve agility and coordination is an urgent requirement, contributing to overcoming professional weaknesses and improving the team's competitive performance in the upcoming period.

Research Methods: The study utilized the following methods: (1) Document analysis and synthesis method, (2) Pedagogical survey method, (3) Pedagogical experiment method, and (4) Mathematical statistics method.

Research Subjects: 20 experts, lecturers, and coaches in the field of basketball; 20 athletes from the Men's Basketball Team of Ho Chi Minh City University of Industry and Trade.

Research Results

1. Current Status of Agility and Coordination of the Men's Basketball Team at Ho Chi Minh City University of Industry and Trade

1.1 Selection of Tests for Assessing Agility and Coordination

Through the analysis and synthesis of literature from global basketball experts, 8 suitable tests were compiled to evaluate the agility and coordination status of the HUIT Men's Basketball Team. Subsequently, a survey was conducted with 20 experts, coaches, and lecturers specializing in basketball using a 5-point Likert scale:

- **5 points:** Highly applicable / Highly practical
- **4 points:** Applicable / Practical
- **3 points:** Undecided / Neutral
- **2 points:** Low applicability
- **1 point:** Not applicable

Selection criteria: Tests achieving a total score ≥ 80 points and ensuring high feasibility during data collection were selected. The expert survey results are presented in Table 1.

Table 1: Results of expert interviews on selecting agility and coordination tests for the HUIT Men's Basketball Team

No.	Test Name	Highly Applicable (5 pts)	Applicable (4 pts)	Neutral (3 pts)	Low Applicability (2 pts)	Not Applicable (1 pt)	Total Score
1	Illinois Agility Test (s)	18	2	0	0	0	98
2	Agility T-Test (s)	17	3	0	0	0	97
3	Pro Agility Test (5-10-5) (s)	4	7	5	3	1	70
4	Hexagon Agility Test (s)	14	5	1	0	0	93
5	Lane Agility Test (s)	16	4	0	0	0	96

6	Zig-zag Dribble Test (s)	3	6	6	4	1	66
7	Slalom Dribble Test (s)	13	6	1	0	0	92
8	Compass Agility Test (s)	2	5	7	4	2	61

Based on the interview results in Table 1, the 5 tests with a total score exceeding 80 points were selected. The validity of these tests was further tested, and the results are shown in Table 2.

Table 2: Results of validity determination for the selected agility and coordination tests for the HUIT Men's Basketball Team

No.	Test Name	Correlation Coefficient (r)	Probability Value (P)	Validity Level
1	Illinois Agility Test (s)	0.84	< 0.05	Very High
2	Agility T-Test (s)	0.89	< 0.05	Very High
3	Hexagon Agility Test (s)	0.78	< 0.05	High
4	Lane Agility Test (s)	0.86	< 0.05	Very High
5	Slalom Dribble Test (s)	0.91	< 0.05	Extremely High

The reliability of the tests was subsequently evaluated by having 20 athletes from the HUIT Men's Basketball Team perform the 5 tests twice, with a one-week interval. The reliability results are presented in Table 3.

Table 3: Reliability assessment of the selected agility and coordination tests for the HUIT Men's Basketball Team (n = 20)

No.	Test Name	(n = 20)		Correlation Coefficient (r)	Probability Value (P)
		Test 1 ($\overline{X} \pm \delta$)	Test 2 ($\overline{X} \pm \delta$)		
1	Illinois Agility Test (s)	16.61 ± 0.42	16.57 ± 0.39	0.88	< 0.05
2	Agility T-Test (s)	10.77 ± 0.31	10.74 ± 0.28	0.92	< 0.05
3	Hexagon Agility Test (s)	13.11 ± 0.54	13.06 ± 0.48	0.85	< 0.05
4	Lane Agility Test (s)	12.90 ± 0.43	12.84 ± 0.38	0.90	< 0.05
5	Slalom Dribble Test (s)	13.61 ± 0.61	13.54 ± 0.55	0.94	< 0.05

Thus, through rigorous selection steps, comprehensive tests evaluating the current status of agility and coordination for the HUIT Men's Basketball Team were established:

- The Illinois, T-Test, and Hexagon tests comprehensively reflect foundational physical agility (multi-directional change-of-direction speed, ankle frequency, and dynamic balance).
- The Lane Agility Test and Slalom Dribble Test demonstrate profound basketball-specific characteristics (keyway maneuvering, non-visual ball control combined with scoring).

1.2 Assessment of the Current Agility and Coordination Status for the HUIT Men's Basketball Team (n = 20)

To evaluate the current status, 20 athletes from the HUIT Men's Basketball Team were assessed using the 5 selected tests, and results were classified according to the National Strength and Conditioning Association (NSCA) standards.

Table 4: Test results assessing the current agility and coordination status for the HUIT Men's Basketball Team (n = 20)

No.	Test Name	Test Result ($\overline{X} \pm \delta$)	Coefficient of Variation CV%	Classification (NSCA Standards)
1	Illinois Agility Test (s)	16.61 ± 0.42	2.53	Average
2	Agility T-Test (s)	10.77 ± 0.31	2.88	Average
3	Hexagon Agility Test (s)	13.11 ± 0.54	4.12	Average
4	Lane Agility Test (s)	12.90 ± 0.43	3.33	Average
5	Slalom Dribble Test (s)	13.61 ± 0.61	4.48	Good/Average

Based on Table 4, the coefficients of variation (CV%) for all tests ranged from 2.53% to 4.48% (< 10%). This confirms that the sample dispersion is very low, indicating a high degree of homogeneity in agility and coordination levels among team members. This ensures high representativeness and validity when dividing the sample into two independent groups (Experimental and Control groups) for pedagogical experimentation.

Furthermore, classification according to NSCA standards showed that 4 out of 5 tests were rated as "Average," and 1 test was rated as "Good / Average" (Slalom Dribble Test), indicating that the agility and coordination capacities of the HUIT Men's Basketball Team still exhibit significant limitations.

2. Formulation of the Agility and Coordination Training Program for the HUIT Men's Basketball Team

2.1 Selection of Agility and Coordination Exercises for the HUIT Men's Basketball Team

The study compiled 26 potential exercises to enhance agility and coordination for the HUIT Men's Basketball Team. Expert consultations were conducted using a 5-tier priority scale:

- **Priority 1 (5 pts):** Highly practical / Mandatory inclusion in supplementary programs.
- **Priority 2 (4 pts):** Practical / Recommended for inclusion.
- **Priority 3 (3 pts):** Neutral / Consider for inclusion.
- **Priority 4 (2 pts):** Low practicality.
- **Priority 5 (1 pts):** Impractical.

The selected exercises are those achieving a total score of 85 or higher from the experts

Table 5: Expert interview results for selecting agility and coordination enhancement exercises for the HUIT Men's Basketball Team

No.	Exercise Name	Priority 1 (5 pts)	Priority 2 (4 pts)	Priority 3 (3 pts)	Priority 4 (2 pts)	Priority 5 (1 pt)	Priority Score
I. Non-Ball Group (Change of Direction - COD)							
1	Lateral In-Out Agility Ladder Drill	18	2	0	0	0	98
2	Ickey Shuffle Agility Ladder Drill	17	3	0	0	0	97
3	Zig-zag Cone Drill	19	1	0	0	0	99
4	Figure-8 Cone Drill	18	1	1	0	0	97
5	Hurdle T-Jump Drill	17	2	1	0	0	96
6	Defensive Slide Box Drill	20	0	0	0	0	100
7	Single-Leg Ickey Shuffle Ladder Drill	4	6	4	4	2	66
II. Coordination & Ball Handling							
8	Forward-Backward Two-Ball Synchronous Dribbling	17	3	0	0	0	97
9	Alternating Two-Ball Dribbling	18	2	0	0	0	98
10	Figure-8 Moving Crossover Drill	17	2	1	0	0	96
11	Slalom Front Crossover Dribble Drill	19	1	0	0	0	99
12	High-Low Alternating Two-Ball Dribbling	5	5	5	3	2	*68*
13	Tennis Ball Toss with One-Handed Basketball Dribbling	18	2	0	0	0	98
14	Wall Fingertip Taps	17	3	0	0	0	97
III. Sport-Specific Coordination							
15	Sprint, Catch, and Jump Stop Shot	19	1	0	0	0	99
16	Slalom Dribble with Continuous 360-degree Spin Moves	3	6	7	3	1	67
17	V-Cut and Pop Out for Three-Point Catch and Shoot	6	4	5	5	0	71
18	Slalom In-and-Out / Spin Move Drill	18	2	0	0	0	98
19	Close-out to Choppy Steps and Contest Drill	18	1	1	0	0	97
20	Supine Transition to Fastbreak Lay-up	17	3	0	0	0	97
IV. Reactive Agility							
21	Four-Corner Coordinate Hurdle Jump	18	2	0	0	0	98
22	Mirror Agility Drill	5	6	4	3	2	69
23	Four-Corner Reactive Shuttle Run	19	1	0	0	0	99
24	Coach's Hand Signal Directional Drill	17	3	0	0	0	97
25	Two-Cone Reactive Steal Drill	18	2	0	0	0	98
26	Defensive Slide under Random Whistle Audio Cues	2	4	6	5	3	57

Expert consultations eliminated 6 exercises scoring below 85 points. Consequently, 20 optimal exercises were selected and categorized into 4 distinct groups:

- **Non-Ball Group (Change of Direction - COD):** 6 exercises.
- **Coordination & Ball Handling Group:** 6 exercises.
- **Sport-Specific Coordination Group:** 4 exercises.
- **Reactive Agility Group:** 4 exercises.

2.2 Training Program Architecture for the HUIT Men's Basketball Team

- **Experiment Duration:** 12 weeks, 3 sessions per week, lasting 20–30 minutes integrated into the advanced warm-up or physical conditioning session.

- **Experimental Subjects:** 20 athletes from the HUIT Men's Basketball Team, randomly divided into two equal groups:

- **Training Program Breakdown**

Introductory Week (Pre-experiment): First baseline testing.

Phase 1: Motor Pattern Shaping & Neuromuscular Adaptation (Weeks 1 – 4)

Objectives: Increase stride frequency, activate ankle musculature, and cultivate independent two-hand ball control without visual reliance.

Exercise Allocation

- **Group 1 (Non-ball):** Exercises 1 (Lateral In-Out Agility Ladder Drill), 2 (Ickey Shuffle Agility Ladder Drill), 3 (Zig-zag Cone Drill).

- **Group 2 (Coordination/Ball handling):** Exercises 7 (Forward-Backward Two-Ball Synchronous Dribbling), 8 (Alternating Two-Ball Dribbling), 12 (Wall Fingertip Taps).

Training Methodology: Focus on technical precision and range of motion. Intensity progressively scales from \$60\%\$ to \$75\%\$ of maximum capacity.

Phase 2: Explosive Development & Optimal Direction-Change Speed (Weeks 5 – 8)

Objectives: Optimize braking time (deceleration) and explosive acceleration during directional shifts; elevate multi-tasking coordination pressure for upper and lower extremities.

Exercise Allocation

- **Group 1 (High-intensity non-ball):** Exercises 4 (Figure-8 Cone Drill), 5 (Hurdle T-Jump Drill), 6 (Defensive Slide Box Drill).

- **Group 2 (Advanced coordination):** Exercises 9 (Figure-8 Moving Crossover Drill), 10 (Slalom Front Crossover Dribble Drill), 11 (Tennis Ball Toss with One-Handed Basketball Dribbling).

Training Methodology: Max-effort execution (100% intensity) in short durations (< 15 seconds/rep) to stimulate the alactic-phosphate energy system. Adequate rest intervals between sets to ensure full muscular recovery.

Phase 3: Sport-Specific Coordination & Reflexive Agility (Weeks 9 – 12)

Objectives: Translate mechanical agility into competitive performance capacity, integrating situational reading and scoring execution under time constraints.

Exercise Allocation

- **Group 3 (Sport-specific coordination):** Exercises 13 (Sprint, Catch, and Jump Stop Shot), 14 (Slalom In-and-Out / Spin Move Drill), 15 (Close-out to Choppy Steps and Contest Drill), 16 (Supine Transition to Fastbreak Lay-up).

- **Group 4 (Reactive agility):** Exercises 17 (Mirror Agility Drill), 18 (Coach's Hand Signal Directional Drill), 19 (Two-Cone Reactive Steal Drill), 20 (Four-Corner Reactive Shuttle Run).

Training Methodology: Simulation of real match scenarios. Manual stopwatch timekeeping was intensified to monitor overall completion times, prompting students to self-regulate optimal footwork speed.

Concluding Week (Post-experiment): Second performance testing.

Conclusion

The study has identified 05 tests to evaluate the current status of agility and coordination for the Men's Basketball Team of Ho Chi Minh City University of Industry and Trade (HUIT), including: Illinois Agility Test (s), Agility T-Test (s), Hexagon Agility Test (s), Lane Agility Test (s), Slalom Dribble Test (s).

The study has selected 20 appropriate exercises contributing to the enhancement of agility and coordination for the HUIT Men's Basketball Team. These exercises are systematically categorized into 4 specialized functional groups: Non-Ball Agility (Change of Direction - COD), Coordination and Ball Handling, Sport-Specific Coordination, and Reactive Agility.

The study has successfully established a detailed 12-week training program with a fixed frequency of 3 sessions per week, lasting 20–30 minutes integrated into the advanced warm-up session. The training progression is clearly periodized across 3 biomechanical phases: Motor Pattern Shaping & Neuromuscular Adaptation (Weeks 1–4), Explosive Development & Optimal Direction-Change Speed (Weeks 5–8), and Sport-Specific Coordination & Reflexive Agility (Weeks 9–12).

Acknowledgments

The author gratefully acknowledges the support provided by the Ho Chi Minh City University of Industry and Trade, Vietnam, throughout this research. Special appreciation is extended to all students, faculty members, and educational administrators who participated in the study and provided invaluable insights. Furthermore, the author wishes to express sincere gratitude to the anonymous reviewers and editorial board members for their insightful comments and constructive suggestions, which significantly enhanced the quality of this manuscript.

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