Research on Cultivating Students' Decision-Making Ability in Campus Football Matches

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Abstract: *Against the background of the high-quality development of campus football, young players' on-field decision-making ability is the key to improving their competitive level and match quality. At present, campus football training emphasizes technical and physical skills while neglecting cognitive decision-making, which makes it difficult to meet the demands of actual matches. Based on information processing theory and combined with the characteristics of campus football competitions, this paper explains the connotation, cognitive mechanisms, and constraining factors of decision-making ability, constructs a six-layer pyramid ability structure, and designs a three-in-one training system comprising variable situation training, limited-information fast-decision training, and multi-objective conflict optimization training. This study can serve as a reference for grassroots coaches to optimize their training programs and help transform campus football from scale-oriented popularization to quality-oriented improvement.*

Keywords: *campus football; young players; decision-making ability; information processing theory; time pressure; cognitive training; tactical awareness*

Introduction

Campus football serves as an important carrier for the development of youth sports and the cultivation of reserve football talents in China, and it is moving toward a stage of standardized, scientific, and efficient development. Football is a cognitive-motor coordinated sport in an open and dynamic environment, where every technical action performed by players relies on rapid information processing and continuous decision-making, and decision-making ability is a higher-order cognitive ability that determines competitive performance. At present, campus football training mainly focuses on static techniques, fixed routines, and conventional physical conditioning, with training scenarios disconnected from actual matches. Grassroots coaches lack sufficient understanding of decision-making ability and tend to attribute decision-making errors to superficial factors. Since young players' cognitive abilities are not yet mature, they often experience problems on the field such as narrow observation, delayed judgment, blind choices, and increased errors under high pressure, all of which restrict the improvement of their competitive level. Based on the information processing theory, this paper clarifies the mechanisms and influencing factors of decision-making ability and designs a training program tailored to the actual context of campus football, thereby providing support for the scientific reform of training.

1. Core Connotation and Cognitive Operation Mechanism of Decision-Making Ability in Campus Football Matches

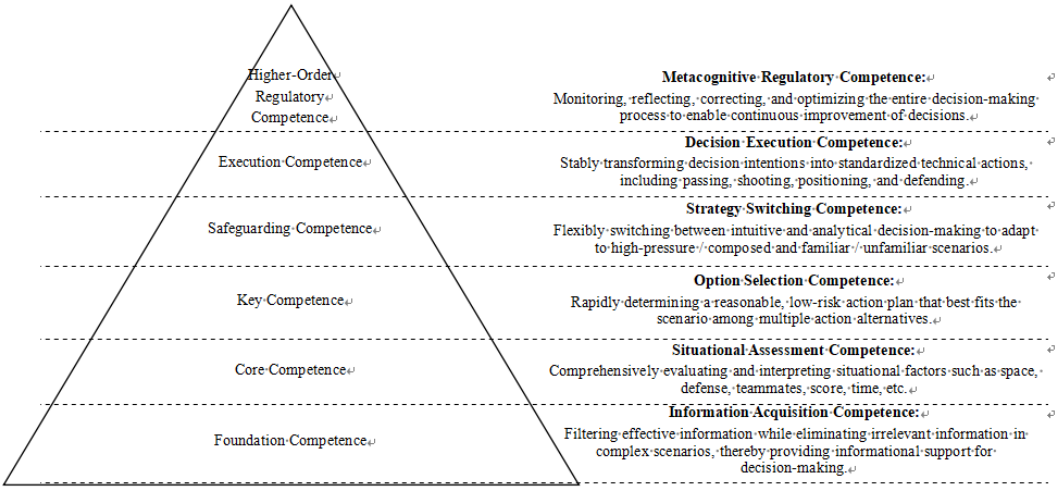
1.1 Core Connotation and Ability Structure of Decision-Making Ability

Campus football decision-making ability refers to the comprehensive cognitive and action ability of student players to rapidly complete information perception, situation assessment, solution generation, optimal selection, action execution, and real-time correction in a match environment characterized by dynamic confrontation, time constraints, and information interference. Campus football mainly adopts the forms of five-a-side and seven-a-side games, which feature small fields, fewer participants, fast transitions between offense and defense, dense confrontations, short decision-making windows, and high information density. These characteristics impose four basic requirements on decision-making: rapidity, locality, adaptability, and stability.

From the perspective of the decision-making ability structure, student players' decision-making ability consists of six mutually supportive sub-dimensions: information acquisition ability, situational

assessment ability, option selection ability, strategy switching ability, decision execution ability, and metacognitive regulation ability (see Figure 1).

Figure 1: Six-Layer Pyramid Model of Students' Decision-Making Competence in Campus Football



Information acquisition ability serves as the foundation, which refers to the player's ability to filter effective information and eliminate distracting information from a complex environment; situational assessment ability serves as the core, which refers to the player's comprehensive judgment ability regarding key elements such as spatial gaps, defensive intensity, teammate positions, match time, and score situation; option selection ability serves as the key, which refers to the player's ability to quickly determine the optimal or suboptimal plan among multiple action options; strategy switching ability serves as the safeguard, which refers to the player's ability to flexibly switch between intuitive decision-making and analytical decision-making and adjust decision-making methods according to the situation; decision execution ability serves as the implementation link, which refers to the player's ability to transform decisions into standardized technical actions; metacognitive regulation ability serves as the higher-order ability, which refers to the player's ability to monitor, reflect on, correct, and optimize his or her own decision-making process. The above six abilities support each other at different levels and operate in coordination, together forming a complete closed-loop decision-making ability system, where each ability is indispensable, and together they determine the player's decision-making performance on the field.

1.2 Cognitive Mechanism of Match Information Extraction and Screening

A football match presents a complex environment where multi-source information, dynamic changes, redundant information, and distracting information coexist. The starting point of decision-making is the effective extraction and precise screening of information. Players need to simultaneously process information such as the ball's position, player movements, spatial distribution, competition rules, and the score. The processing efficiency depends on visual search strategies, attention allocation methods, working memory capacity, and tactical patterns accumulated in long-term memory. Players with weaker decision-making ability usually adopt a single observation path, fixate on the ball or the immediate defender, have a narrow field of vision, and are prone to missing key information. Higher-level players can actively scan the field before receiving the ball, focus on key points while touching the ball, and perceive the overall situation when off the ball, thereby achieving a reasonable allocation of attention to the ball, players, and space.

Due to the limited capacity of working memory, the limited capacity of working memory requires the suppression of distracting information; tactical templates stored in long-term memory can reduce cognitive load. Campus football scenarios are highly repetitive, but traditional training lacks systematic extraction, which results in students having insufficient pattern reserves and delayed decision-making responses.

1.3 Time Pressure Effect and Decision Adaptation Mechanism in Dynamic Confrontation

Time pressure is a core factor affecting decision-making efficiency. The decision-making window in

campus football is mostly 1 – 2 seconds. Time pressure has a nonlinear negative correlation with decision accuracy; when the pressure increases by one level, the accuracy decreases by 15% – 20%. Moderate pressure improves the efficiency of passing the ball, whereas exceeding the threshold pressure causes cognitive overload and an increase in errors. The midfield has the highest information load and the most errors; wingers are less affected; the time pressure in defense-counterattack situations is the most prominent. Under high pressure, young players tend to switch to intuitive decision-making, but their lack of experience leads to irrational choices.

1.4 Adaptive Switching Patterns of Decision-Making Strategies

Given the dynamic uncertainty of the football field, players need to flexibly switch between intuitive decision-making and analytical decision-making. Intuitive decision-making is fast and low-cost, and it is suitable for high-pressure and familiar scenarios; analytical decision-making is precise and time-consuming, and it is suitable for unfamiliar scenarios with ample time. Student players generally experience a strategic misalignment characterized by "excessive analysis under high pressure, blind processing when time is abundant, and rigid decision-making inertia." Cognitive flexibility and metacognitive monitoring are the keys to smooth strategy switching.

2. Multidimensional Constraining Factors for the Development of Student Decision-Making Ability in Campus Football

The formation and development of campus football student decision-making ability is the result of the combined effect of individual intrinsic cognitive factors, tactical literacy, external situational factors, and training factors, and it does not simply arise naturally from match experience. Taking into account the realistic scenarios of campus football and the characteristics of adolescent cognitive development, the development of student decision-making ability is mainly constrained by three core dimensions: the level of tactical awareness, the complexity of competition scenarios, and the frequency and structure of feedback. These three dimensions interact and influence each other, and together they determine the development speed and the upper limit of decision-making ability.

2.1 Level of Tactical Awareness: Intrinsic Core Constraint

Tactical awareness refers to the player's overall understanding and anticipatory ability regarding the laws of the game, spatiotemporal relationships, offensive and defensive principles, and tactical intentions, and it serves as the intrinsic soul of decision-making. At present, the tactical awareness of student players generally exhibits the characteristics of superficiality, fragmentation, and passivity. First, they do not observe when off the ball, which leads to passive and delayed decision-making. Second, their spatiotemporal anticipation ability is weak, and they are not good at creating and utilizing space. Third, their positioning and transition awareness between offense and defense are insufficient, resulting in a disconnect between individual actions and team tactics. Fourth, some players have clear ideas but fail to execute them properly, and their technical stability constrains the implementation of decisions. The root cause lies in the fact that the training process emphasizes action completion over thinking and judgment, and values outcome achievement over process guidance. Coaches rarely explain the laws of the game, space utilization, offensive and defensive logic, and other related content in a systematic manner, and students lack systematic review and pattern generalization. As a result, tactical knowledge is difficult to internalize into stable awareness.

2.2 Complexity of Competition Scenarios: External Situational Constraint

The complexity of competition scenarios is jointly constituted by elements such as the number of information dimensions, the number of action options, the intensity of time pressure, the degree of confrontation interference, and the frequency of situational changes, and it serves as a key external factor affecting decision accuracy and stability.

The relationship between scenario complexity and decision accuracy presents an inverted U-shaped curve. In low-complexity scenarios, the information is clear, the options are single, and there is no confrontation pressure, so the decision accuracy is relatively high, but such scenarios can hardly promote the improvement of decision-making ability. In medium-complexity scenarios, the information is moderately rich and the options are reasonably diverse, so students can complete efficient processing within the limit of their cognitive load, and the decision accuracy reaches its peak. In high-complexity

scenarios, information overload, excessive pressure, and excessively rapid changes exceed the students' cognitive processing limits, so the decision accuracy drops sharply.

2.3 Feedback Frequency and Structure: Key Moderating Factor

Feedback serves as the core link that transforms external tactical requirements and decision-making principles into students' internal judgment standards and behavioral habits. Scientific feedback has different stages: the introductory stage adopts high-frequency and immediate feedback to help establish basic rules; the consolidation stage uses moderately delayed feedback to facilitate independent thinking and deep internalization.

Current training feedback generally has the following three prominent problems. First, the structure is single, with an emphasis on the correctness of outcomes rather than on the cognitive process. Second, the frequency is unbalanced, with the coexistence of no feedback and excessive feedback. Third, attribution bias exists, as errors are often attributed to superficial factors such as technique or attention, while cognitive roots such as information processing and strategy selection are ignored. The advantages of campus football, namely fast match rhythm, quick turnovers, and dense feedback, cannot be transformed into effective resources for improving decision-making ability due to the crude design of feedback.

3. Systematic Training Design for Cultivating Student Decision-Making Ability in Campus Football

Based on the cognitive operation mechanism and multidimensional constraining factors of campus football student decision-making ability, and following the laws of adolescent cognitive development, the formation laws of football skills, and the orientation toward practical match transfer, this paper constructs a three-in-one modular system of "variable situation decision-making training, limited-information fast decision-making training, and multi-objective conflict decision optimization training" (see Table 1 below) according to the progressive logic from easy to difficult, from simple to complex, from static to dynamic, from single to compound, and from training to match application. This system progresses step by step from simple to complex and is adapted to the practical needs of campus football.

Training Module	Core Objective	Design Logic	Training Principle	Main Practice Forms
1. Variable Situation Decision-Making Training	It aims to improve decision-making flexibility and adaptability and to break fixed path dependence.	It uses aperiodic situational variations to force players to continuously perceive, assess, and adjust their decisions.	Its training principles include systematic variation, progressive loading, process orientation, and practical match transfer.	Its main practice forms include 2v1/3v2 basic variations, multi-dimensional scene changes, random formation switching, and dynamic space exercises.
2. Limited-Information Fast Decision-Making Training	It aims to improve rapid decision-making and robustness under high-pressure, information-incomplete scenarios.	It simulates real constraints such as visual obstruction, incomplete information, and time urgency.	Its training principles include information limitation, hierarchical progression, robustness orientation, and heuristic reinforcement.	Its main practice forms include short-term observation decision-making, vision-blocking confrontation, information gap limitation, and ambiguous situation processing.
3. Multi-Objective Conflict Decision Optimization Training	It aims to improve rational evaluation and optimal selection ability under multiple options.	It constructs a process of "option generation, weight evaluation, plan selection, and review optimization".	Its training principles include complete options, weight evaluation, high-frequency scenarios, and retrospective review.	Its main practice forms include single-objective conflict, multi-dimensional composite conflict, key area optimization, and decision review reflection.

Table 1: Overall Design of the Three Decision-Making Training Modules

3.1 Decision Response Training Under Variable Situation Stimulation

Through systematic, controllable, and aperiodic situational changes, this training breaks students' path dependence on fixed scenarios, fixed routes, and fixed combinations, and it forces players to re-perceive information, reassess situations, and adjust decisions in each practice, thereby strengthening decision-making flexibility and adaptability. The training randomly adjusts variables such as the number of defenders, positioning, ball speed, and space locations, and it gradually increases the cognitive load from single-dimensional variation to multi-dimensional variation. The evaluation focuses on observation quality, information screening, and strategy selection. All exercises adopt high-frequency, real-life scenarios from campus football, ensuring that the training effects can be directly transferred to actual matches.

3.1.1 Specific Training Implementation Methods

a. Basic variation exercise: The coach sets up small-sided confrontations such as 2v1 and 3v2, and randomly adjusts the defenders' positioning, timing of pressing, and defensive intensity. This exercise requires the attacking players to quickly choose passing, dribbling, or shooting based on the defensive changes.

b. Multi-dimensional variation exercise: Within a half-court area, the coach randomly adjusts the number of attacking and defending players, field size, goal dimensions, and time limits. This exercise

requires the players to complete continuous decision-making and coordination in changing situations.

c. Aperiodic formation variation exercise: The defensive side switches irregularly between man-to-man marking, zonal defense, and mixed defense formations. The attacking players need to quickly identify the defensive formation and adjust their runs and decision-making directions.

d. Dynamic space variation exercise: The coach or marker cones dynamically block passing routes and spatial gaps, forcing the players to continuously observe, anticipate changes in space, and adjust their decisions in real time.

3.2 Fast Decision-Making Training Under Limited Information Conditions

This training simulates constraint scenarios in actual matches such as visual obstruction, incomplete information, time urgency, and chaotic situations, and it artificially creates information gaps to reduce information availability. It trains students' abilities to make quick judgments, robust decisions, and risk control under conditions of incomplete and uncertain information. The training creates information gaps through methods such as obstruction and time-limited presentation, and it gradually increases the difficulty from single-cue absence to multi-cue absence and then to dynamic absence. It does not pursue absolute optimality; instead, it emphasizes reasonable, low-risk, and robust choices, and it guides students to summarize fast decision-making rules to improve judgment efficiency.

3.2.1 Specific Training Implementation Methods

a. Short-term observation decision-making exercise: The coach uses a screen or an occluding board to briefly present a match scene for 1-2 seconds and then turns it off. This exercise requires the students to quickly judge the optimal action plan, thereby improving their ability to capture information rapidly.

b. Vision-blocking decision-making exercise: The coach uses boards or marker cones to block some players and spaces during training. This exercise simulates scenes where vision is blocked in actual matches and requires the players to make decisions based on partial information and anticipation.

c. Information gap confrontation exercise: In small-sided confrontations, the coach limits the number or duration of observations allowed for the players. This exercise forces the players to pass and decide quickly under limited information conditions.

d. Ambiguous situation decision-making exercise: The coach sets up chaotic scenes with dense player distribution, disordered ball paths, and complex situations. This exercise requires the players to quickly sort out key clues from the chaotic information and make robust decisions.

3.3 Decision Optimization Training in Multi-Objective Conflict Situations

This training focuses on high-frequency scenarios where multiple objectives compete with one another, such as shooting, passing, ball control, breaking through, and switching sides. It guides students to establish a systematic decision-making process of "generating complete options, evaluating multi-dimensional weights, selecting the optimal plan, and conducting decision review and reflection". This training aims to solve the problems of single options, blind choices, and disordered priorities. It requires students to quickly list all reasonable options, set action priorities based on factors such as time, score, space, and risk, and focus on core scenarios such as midfield organization, penalty area handling, and offensive-defensive transitions. After each practice, it compares the actual choice with the optimal plan to reinforce correct decision-making logic.

3.3.1 Specific Training Implementation Methods

a. Basic conflict exercise: The coach sets up single-conflict scenarios such as "shoot or pass," "break through or switch sides," or "control the ball or launch a fast break." This exercise trains students to quickly evaluate and make choices.

b. Multi-dimensional conflict exercise: The coach combines multiple factors such as score, time, space, and numerical advantage to set up composite conflict scenarios. This exercise requires students to make decisions after comprehensive evaluation.

c. Key scenario optimization exercise: The coach focuses on key areas such as the front of the penalty area, the central midfield zone, and counterattack fast breaks to carry out multi-objective conflict decision-making exercises. This exercise improves students' ability to handle critical moments.

d. Decision review exercise: The coach combines video playback, on-site explanation, student self-

evaluation, and peer evaluation to review the decision-making process and summarize optimization rules.

4. Conclusion and Prospect

4.1 Research Conclusions

First, student decision-making ability is a higher-order ability that results from the coordination of three mechanisms: information extraction and screening, time pressure adaptation, and dynamic strategy switching. Information processing efficiency, pressure adaptability, and strategy fluency are the core elements.

Second, student decision-making ability is jointly constrained by three factors: tactical awareness, the complexity of competition scenarios, and the training feedback system. The traditional training model can hardly support its systematic development.

Third, the modular system of the three-in-one training system conforms to the cognitive characteristics of adolescents and the campus football environment, and it can systematically improve the flexibility, rapidity, rationality, and stability of decision-making, which is practically feasible.

Fourth, the cultivation of decision-making ability requires three major transformations: from passive reaction to anticipation-driven action, from mechanical technical training to cognitive-motor coordinated training, and from outcome-oriented evaluation to process-oriented evaluation, ultimately achieving the coordinated development of technique, physical fitness, and cognition.

4.2 Research Prospect

This study has constructed a theoretical framework and a training system for cultivating student decision-making ability in campus football, which provides a foundation for subsequent research and practice. However, there remains room for further deepening and expansion. Future research can be deepened from four directions. First, it can use cognitive neuroscience techniques to reveal the internal mechanisms of decision-making and improve training precision. Second, it can conduct longitudinal follow-up studies by age, gender, and position to develop differentiated cultivation plans. Third, it can explore the synergistic effects among football decision-making ability, general cognition, and academic learning to strengthen educational value. Fourth, it can develop simple and operable tools for evaluating decision-making ability to achieve quantitative monitoring and scientific assessment.

The high-quality development of campus football cannot be separated from the deep cultivation of adolescents' cognitive abilities. Grassroots coaches should update their training concepts, integrate decision-making ability cultivation into the entire process of daily training, and guide practice with cognitive principles. This approach helps students achieve comprehensive development in technique, physical fitness, cognition, and personality through football, thereby laying a solid foundation for the cultivation of reserve football talents in China.

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