Diagnosis of bowling techniques in the multi-year training system for cricketers

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Abstract
Based on two published studies, the diagnosis of bowling technique as a link in the long-term training of cricketers has been examined. Observations of 20 players from the "Afrosiyob" and "Barlos" teams and the initial results of nine control tests of two groups of 15-16 year-old bowlers from the "Barlos" and "ANFA Cricket Club" teams were compared. Individual indicators, mean values, standard deviations, and published variation coefficients have been preserved. According to the republican article, 70 accurate shots out of 200 served, or 35%, were calculated. A sequence of transitions from analyzing the structural components of the feed to evaluating the technique and targeted correction is proposed. The results of observations and methodological recommendations for training the sports reserve are separated.
Key words: cricket, long-term training, bowling, sports reserve, technical errors, control tests.

Introduction

The long-term training of a highly qualified cricketer begins with the formation of a technical foundation upon which competitive activities are subsequently built. For a bowler, such a basis is the consistency of catching the ball, running, moving to the support, swinging, and releasing. If only the result of the serve is evaluated, the coach receives information about accuracy but does not always understand which component limits the result. Therefore, diagnostics must connect the observed error with the corresponding technical element.

B. B. Abdiyev's republican work identifies nine structural components of bowling and presents the results of observations of 20 players. In the subsequent English-language publication, nine control exercises were developed and the initial indicators of young bowlers from two groups were presented. These materials solve different tasks: the first describes the execution of a holistic movement and accuracy, while the second allows for the evaluation of individual components through the number of successful attempts. Their joint consideration provides a basis for building a consistent system of pedagogical control.

The transition to high qualifications requires continuity between diagnosing the sports reserve and further improving the technique. In the FTEM model, J. P. Gulbin and co-authors consider the development of an athlete through interconnected stages and transitions between them. In this context, the initial results of 15-16 -year-old bowlers characterize one of the areas of multi-year preparation. They are not standards of high qualification, but they help determine the tasks that must be solved before further complication of training requirements.

Purpose of research. To substantiate the diagnostic system for bowling technique in long-term cricket training by comparing published data on structural pitching errors and control test results.

Research methods and organization. An analysis of two author's publications, a comparison of diagnostic criteria, and secondary descriptive processing of available individual data were performed. The republican study utilized pedagogical observation and analysis of technique execution using the Smart Pitch program based at the Uzbekistan Cricket Federation. Twenty bowlers from the "Afrosiyob" and "Barlos" teams participated, each completing 10 innings. The age of the participants in this publication is not specified.

The English-language study utilized literature analysis, video analysis, and pedagogical observation. The initial results of the "Barlos" control group and the "ANFA Cricket Club" experimental group are presented: 15 bowlers each aged 15-16. Each of the nine exercises was evaluated in six attempts. Group names have been preserved according to the source; the final results of the pedagogical experiment are not presented in the article.

The arrays are considered separately. A match of the "Barlos" team name does not confirm a match of participants. Individual records from the first work were used to calculate the total accuracy and range of indicators. The mean values, standard deviations, and variation coefficients from the second work are repro-

duced without replacement. Statistical unification of samples and conclusions regarding the effectiveness of training interventions were not implemented.

Results and discussion

In the republican article, the following are highlighted: catching the ball; running; pushing off with the front leg; flight phase; landing on the back leg; putting forward the front leg; swinging; releasing the ball; and completing the movement. English-language work translates this sequence into a system of control exercises. Table 1 preserves all nine tests and their observed signs.

Table 1. Control of bowling structural components

Component	Control exercise	Sign of a successful attempt
Ball capture	Catch-up demonstration	Positioning the fingers on the sutures and fixing the wrist.
Running	Running on an 80 cm wide track	Maintaining direction, balance, and movement control.
Repulsion	Long jump from a running start with a single leg push-up	Pronounced recoil with the front leg; straightening of the leg and torso.
Flight phase	Maintaining body balance during flight	Stability, body position, absence of excessive tension, and control.
Landing	Jumping from a bench with a landing on the back leg	Soft landing on the front of the foot, knee flexion, and balance.
Front support	Passing the ball with a forward step	Smooth placement of the front leg after landing, stability, and control of completion.
Wave	"Dry" swing	Smoothness, sufficient height and speed of swinging, position of the arm and torso.
Ball release	Throwing the ball toward the target	Accurate aim and position of the hand, wrist, and fingers; degree of technical errors.
Completion	Pass with a walk	Smooth completion, maintaining balance, and a controlled transition to walking.

Source scale for each exercise: "excellent" - 4-6 successful attempts out of 6; "good" - 3; "bad" - 0-2. When evaluating a ball, the correctness of the technique is also taken into account: if "good," minor shortcomings are noted, and if "bad," significant ones.

In the description of the sprint, the first work further highlights the preliminary calculation of the number of steps, the forward inclination of the torso, and the position of both half-folded arms above the waist. The transition to the serve includes a push-off, flight, landing on the back leg, and placing the front leg. For the final part, the swing, release, and continuation of movement after the ball is released are noted [1]. These signs allow for the clarification of the reason for the unsuccessful attempt, rather than limiting oneself to assigning a grade.

The control exercise scale refers to six attempts in a specific test. It cannot be directly applied to the ten competitive-oriented innings from the first work: the tasks and evaluation grounds are different. The correspondence between the two systems is established at the level of technical components, rather than through mechanical recounting of points.

According to individual data, a total of 200 innings were played: 70 accurate and 130 inaccurate. Thus, the accuracy in the examined group was 35%, and the average number of hits per bowler was 3.5 out of 10. Individual indicators were within the range of 2-5 hits, i.e., 20-50%. These values were calculated using the source table.

The number of running steps ranged from 14 to 21; the average across 20 published values was 17.6 steps. Each series features 10 front leg strokes in front of or on the line and none behind the line. The release in the vertical position of the serving hand was recorded in 199 cases out of 200; the horizontal position was noted once in the first player. Consequently, within the scope of the classification used, the

Table 2. Individual scores of 20 bowlers in a 10-inning streak

N	Running, steps	To the target	By	Foot in front / on the line	Foot behind the line	Hand upright	Arm horizontally
1	20	3	7	10	0	9	1
2	17	4	6	10	0	10	0
3	16	2	8	10	0	10	0
4	19	5	5	10	0	10	0
5	19	4	6	10	0	10	0
6	14	3	7	10	0	10	0
7	21	5	5	10	0	10	0
8	15	2	8	10	0	10	0
9	20	4	6	10	0	10	0
10	17	3	7	10	0	10	0
11	18	5	5	10	0	10	0
12	16	2	8	10	0	10	0
13	19	4	6	10	0	10	0
14	15	3	7	10	0	10	0
15	21	5	5	10	0	10	0
16	14	2	8	10	0	10	0
17	20	4	6	10	0	10	0
18	17	3	7	10	0	10	0
19	18	5	5	10	0	10	0
20	16	2	8	10	0	10	0

Each result, excluding the number of steps, represents the number of cases from 10 innings. "Run" is the published average number of steps in a series. Hand position designations reproduce the categories of the original table; they do not replace instrumental analysis of angles and elbow extension.

correct placement of the front support was combined with low precision. This indicates the need for a more detailed analysis of the coordination of movement and ball release. The original work noted shortcomings in selecting running length, head, torso, and limb positions, as well as the release moment [1]. The frequency of each of these deficiencies has not been published separately; therefore, it is impossible to determine their individual contribution to accuracy based on available data.

In the control group, the average results were 2.5–2.8 successful attempts, while in the experimental group, they were 2.6–2.9. The difference between the groups' averages for individual tests did not exceed 0.2 attempts; in the running jump, the indicators coincided and amounted to 2.6. The results characterize the initial state of the technique, rather than the change under the influence of the methodology. The similarity of the ranges is not evidence of the statistical equivalence of the groups.

In the control group, the minimum average values were obtained while maintaining balance in flight and at the end of the serve—2.5 each. In the EG, the minimum values were noted for the running jump and the serve with a transition to walking - 2.6 each. In no test did the mean value reach four successful attempts, which corresponds to the lower boundary of the "excellent" score for an individual athlete. At the same time, the group average does not allow for determining the share of players in each evaluation category.

Table 3. Initial results of control tests for 15-16 year old bowlers

Test	KG $\bar{X}$	KG σ	KG V, %	EG $\bar{X}$	EG σ	EG V, %
Ball capture	2,8	0,7	25	2,9	0,96	33
80 cm treadmill run	2,7	0,6	22	2,8	0,91	34
Jumping from a running start on one leg	2,6	0,6	23	2,6	0,95	38
Flight balance	2,5	0,7	28	2,7	0,85	32
Landing on the back leg	2,6	0,7	27	2,7	0,85	32
Step-forward serve	2,7	0,6	22	2,9	0,93	33
"Dry" swing	2,6	0,6	23	2,7	0,85	32
Throwing the ball at the target	2,7	0,6	22	2,8	0,91	34
Pass with a walk	2,5	0,6	24	2,6	0,95	38

CG - "Barlos,"n=15; EG - "ANFA Cricket Club," n=15. $\bar{X}$ - average number of successful attempts out of 6; σ - standard deviation; V - published variation coefficient. All values are provided exactly according to Tables 2 and 3 of the English-language article.

The standard deviations in the CG were 0.6-0.7, and in the EG, they were 0.85-0.96 attempts. With close averages, this indicates a more pronounced dispersion of initial results in the EG. The published Vs were 22-28% and 32-38% respectively; due to the observed discrepancies, they should be interpreted together with the mean and standard deviations, without clarifying the disputed values based on the aggregated data.

The two arrays complement each other: observing a holistic pitch shows the result and available external features, while testing clarifies the mastery of individual components. This approach aligns with the biomechanical view of bowling as a coordinated movement presented by R. M. Bartlett and co-authors [4]. However, the causal connection between a specific error and hitting the target must be verified in repeated individual observations.

Methodological significance for long-term preparation. Based on the comparison of publications, a sequence of pedagogical work is proposed: observation of full delivery, localization of difficulty, control of the appropriate component, selection of a corrective exercise, and re-verification in a holistic action. For example, an unstable run is checked with an exercise on an 80 cm wide track, a violation of balance is checked with a test in the flight phase, and an inaccurate release is checked with a targeting task with the fixation of the position of the wrist and fingers. The final decision is made based on a combination of testing and observation, rather than a single mark.

In the preparation of the sports reserve, the initial task consists of the stable mastery of components and their coordination. Subsequently, the reproducibility of a solid serve under changing training conditions is monitored. At the high-level qualification stage, the diagnostic scheme can be supplemented with tasks such as managing the direction and length of the serve, analyzing actions against different batsmen, and monitoring technique when fatigue accumulates. These are the areas of application for the model, rather than the results of surveys of highly qualified players in the presented works.

It is advisable to construct an individual protocol in one order: the conditions of execution, the result of submission, the observed error, the success of the component test, and the task of the next session. Repeat control is conducted under comparable conditions. Such an order allows for tracking the transition from eliminating a local deficiency to the stable execution of a holistic action over several stages of preparation.

Conclusion

A joint analysis of two publications allows for the linking of nine structural components of bowling with nine control exercises. Maintaining this connection creates a methodological basis for the consistent diagnosis of technique in multi-year training.

In a national study, 20 bowlers made 200 innings, 70 of which were accurate. A 35% accuracy in the absence of fixed leg postures behind the line confirms the need to consider the result together with the coordination of movement and the specifics of ball delivery.

In 15-16-year-old bowlers, the initial average test results were 2.5–2.8 attempts in the CG and 2.6–2.9 in the EG. These indicators determine the tasks of technical improvement for the sports reserve. Verifying the effectiveness of correction requires repeated individual measurements; published source data do not establish such effectiveness.

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