DOI: https://doi.org/10.37547/mesmj-V7-I8-04 Pages: 30-40

MENTAL ENLIGHTENMENT SCIENTIFIC – METHODOLOGICAL JOURNAL

MENTAL ENLIGHTENMENT SCIENTIFIC – METHODOLOGICAL JOURNAL

http://mentaljournal-jspu.uz/index.php/mesmj/index

SCIENTIFIC AND METHODOLOGICAL FOUNDATIONS FOR IMPROVING THE TEACHING METHODOLOGY OF SHORT-DISTANCE RUNNING TECHNIQUE

Abror Akbarjonovich Mamadaliyev
PhD in psychology, associate professor
Institute of retraining and advanced training of specialists in physical culture and sports
Tashkent, Uzbekistan

ABOUT ARTICLE

Key words: track and field, short-distance running, sprinting, running technique, crouch start, start acceleration, biomechanics, motor skill, teaching methodology, technical errors, individualized correction.

Received: 20.09.26
Accepted: 21.09.26
Published: 22.09.26

Abstract: This article analyzes contemporary scientific and methodological foundations for teaching short-distance running technique. It examines the technical characteristics of the sprint start, start acceleration, running over the distance, and finishing, as well as the mechanisms for teaching these phases in a logical sequence. Drawing on findings from contemporary biomechanical research, the article substantiates the importance of individualizing the crouch-start position, using starting blocks effectively, generating horizontally directed force during the initial steps, establishing an optimal relationship between stride length and stride frequency, and maintaining freedom of movement during the transition to maximal velocity. The potential use of specific preparatory, lead-up, repetitive, variable, and resisted sprint exercises is analyzed. Methodological mechanisms for the early identification of technical errors, determination of their causes, selection of individualized corrective exercises, and integration of learned elements into the complete sprint action are systematized. Based on the analysis, a progressive methodological model founded on the principle of “technique development – pedagogical monitoring – identification of technical errors – individualized correction – reassessment” is proposed.

Introduction. Track and field is one of the fundamental sports within the system of physical education and sport. It is based on natural human movement patterns and provides broad opportunities for the comprehensive development of physical qualities. The extensive use of running, jumping, and throwing exercises in educational and sports training is explained by their practical, educational, and sport-specific training value [1].

Among track-and-field running events, short-distance running is characterized by high movement velocity, rapid mobilization of the neuromuscular system, and a high level of movement coordination. Short-distance running includes the 60, 100, 200, and 400 m events, as well as relay races comprising sprint legs [1].

Short-distance running technique consists of four closely interrelated phases: the start, start acceleration, running over the distance, and finishing [1]. Although each phase has a distinct technical task, together they form a single continuous movement system in competitive performance. Therefore, the teaching process should not be limited to mastering technical elements separately; it should also develop the spatial, temporal, and dynamic relationships between them.

Contemporary biomechanical research considers the block start and the first steps that follow it to be critical phases in determining sprint performance. According to a systematic review, important characteristics of an effective start include starting-block settings in the “set” position that correspond to the athlete’s anthropometric characteristics, active force production by both legs, a short flight time after block clearance, and high propulsive forces [2].

Incorrect acquisition of technical elements during the initial learning stage may lead to the formation of stable erroneous movement patterns. Therefore, it is methodologically important first to establish the correct technical structure of the movement, then progressively increase intensity, systematically identify errors, and select appropriate corrective exercises [1].

In recent years, resisted sprinting, functional training, plyometric exercises, and training tailored to individual technical needs have been widely investigated in sprint preparation. However, contemporary research indicates that the same training means are not equally effective for all athletes or for all phases of sprinting [3–8]. This reinforces the need to select teaching and training means in accordance with a specific technical task and the individual characteristics of the learner.

The relevance of the present problem is determined by the need to integrate traditional progressive teaching methodology with contemporary biomechanical and coordination-based perspectives, while combining technical monitoring and individualized correction within a unified pedagogical system.

Aim of the study. To systematize the theoretical, biomechanical, and pedagogical foundations of teaching short-distance running technique and to substantiate an improved methodological model aimed at the progressive development, monitoring, and individualized correction of technical actions from the start through the finish.

Materials and methods. The study is theoretical-analytical and scientific-methodological in nature. The principal source was A.A. Mamadaliyev's teaching manual "Methodology of Teaching Track and Field" (Yengil atletikani oʻrgatish uslubiyati), specifically the materials devoted to short-distance running technique and its teaching methodology [1]. The source systematically presents the technical phases of sprinting, instructional objectives, specific exercises, methodological guidelines, common technical errors, and methods for their correction.

The source materials were comparatively analyzed against contemporary scientific literature. The methods employed included analysis of scientific and methodological literature, comparative analysis, systematization, pedagogical interpretation, and scientific synthesis. The analysis considered the biomechanics of the start and initial acceleration, resisted sprint training, training based on individual technical needs, functional and plyometric preparation, and contemporary theoretical approaches to sprint coordination [2–10].

The following criteria were used for the analysis: 1) the task of each technical phase; 2) teaching and training means; 3) the sequence of increasing exercise complexity; 4) the relationship between freedom of movement and intensity; 5) common technical errors; 6) means of correcting errors; and 7) consideration of individual characteristics.

Results and discussion. Teaching the crouch start and start acceleration. The crouch start provides favorable conditions for a sprinter to initiate running rapidly and attain high velocity within a short period. The teaching manual describes "medium," "elongated," and "bunched" starting-block settings and indicates that their placement should be determined in accordance with the athlete's speed, strength, and other physical qualities [1]. A contemporary systematic review likewise demonstrates that adapting the starting position to the athlete's anthropometric characteristics is important for effective force production [2].

When teaching the crouch start, it is advisable first to master the “On your marks” and “Set” positions correctly, then progress to starts without an external signal, and subsequently to starts performed in response to signals delivered at varying time intervals [1]. This sequence initially directs the learner’s attention to movement structure and allows the task of responding rapidly to the signal to be introduced after the technique has become more stable.

One of the common errors during start acceleration is raising the trunk and head too early. In this situation, part of the movement component that should be directed forward is redirected vertically. To correct this error, the source recommends adjusting the distance between the starting blocks and the start line, accelerating beneath an inclined rail, and starting from a one-hand-supported position [1]. This methodological approach corrects a technical error not only through verbal instruction but also by modifying the task constraints.

The practical potential of training based on individual technical needs was demonstrated by Wild et al. in highly trained rugby backs: 18-week individualized sprint-acceleration programs were designed according to the athletes’ previously identified technical needs [6]. This finding supports the importance of individual diagnosis and targeted correction rather than the use of an identical package of exercises for all athletes.

Transition from start acceleration to running over the distance. The transition from start acceleration to running over the distance is one of the technically demanding components of sprinting. The athlete must move into free and rhythmic running while reducing excessive muscular tension without losing velocity. The teaching manual recommends free running by inertia after covering a short distance at maximal speed, re-accelerating after a phase of relaxed running, transitioning from acceleration out of a crouch start to relaxed running, and alternating maximal and relaxed running modes [1].

The pedagogical meaning of these exercises is to distinguish between “maximal effort” and “maximally efficient movement.” High velocity is not produced by continuous maximal muscular tension, but by the coordinated alternation of active contraction and timely relaxation and by an efficient relationship between the support and flight phases.

Resisted sprint exercises have been widely studied as an additional means of developing acceleration. In the meta-analysis by Aldrich et al., resisted sprint training produced a small positive change in acceleration, but no statistically significant advantage over an equivalent volume of unresisted sprint training was demonstrated [3]. In contrast, Myrvang and van den Tillaar reported that resisted sprint training was superior to unresisted sprinting for improving

10 m acceleration, although no clear advantage was identified for 20 m performance, maximal velocity, or most kinematic variables [4].

A comprehensive 2025 meta-analysis showed that resistance magnitude and the athlete’s training status are important moderators: moderate and very heavy loads were more effective than unresisted sprinting under certain conditions, with effects being more pronounced during the initial acceleration phase and among better-trained athletes [5]. Thus, resisted sprinting should not be regarded as a universal method; rather, it should be applied according to the specific sprint phase, the athlete’s level of preparation, and individual technical needs.

Developing technique during running over the distance.

During running over the distance, the principal task is to maintain the attained high velocity for as long as possible. The teaching manual emphasizes the development of an individual relationship between stride length and stride frequency in trained sprinters, active placement of the forefoot onto the support surface, rhythmic coordination of arm and leg actions, and a trunk position free from excessive tension [1].

In teaching sprint technique, the objective is not to increase stride length or stride frequency artificially to an absolute maximum, but to develop their individually optimal relationship. Contemporary theory of sprint coordination also interprets movement variability not merely as an “error,” but as a functional component that enables the athlete to adapt to internal and external conditions [10]. Therefore, rather than mechanically forcing every learner into a single externally defined “ideal” form, it is more appropriate to develop an individually effective solution within the fundamental biomechanical requirements of sprinting.

In A.A. Mamadaliyev’s teaching manual “Methodology of Teaching Track and Field” (Yengil atletikani oʻrgatish uslubiyati), it is emphasized that, when refining sprint-running technique, exercise intensity should be increased progressively in accordance with the learner’s level of technical preparedness. In particular, attempting to run at maximal velocity before the running technique has been adequately mastered and physical preparedness sufficiently developed may lead to excessive muscular tension, restricted freedom of movement, and deterioration in technical execution. Therefore, during the initial stages of instruction, the use of relaxed running at approximately one-half and three-quarters intensity is recommended, followed by a gradual increase in running velocity as technical skills improve [1]. This methodological approach enables the learner first to consciously control movement, establish and stabilize an efficient coordinative structure, and subsequently express the acquired technical skills effectively under high-speed conditions.

A systematic review of functional training reported positive changes in sprinting, jumping, and functional movement outcomes in most included studies, although the magnitude of improvement depended on training duration, intensity, and frequency [7]. A meta-analysis of plyometric training in young athletes, however, found only a small and statistically non-significant effect on sprint performance [8]. These findings indicate that technical instruction and physical-preparation methods should be regarded as complementary rather than interchangeable components.

Technique of bend running and finishing.

In the 200 and 400 m events, bend-running technique is of particular importance. The teaching manual recommends progressing from bends with a larger radius to those with a smaller radius, adopting a slight inward lean toward the center of the curve, and combining acceleration with relaxed inertial running when exiting the bend onto the straight [1]. For a crouch start on the bend, the blocks should be positioned so that the athlete can complete the initial steps in as straight a direction as possible before progressively entering the curved trajectory.

When teaching finishing technique, the recommended progression begins with leaning the trunk forward while walking and advances to practicing a “dip” at the finish by projecting the chest forward or rotating the shoulder during slow and fast running [1]. An important methodological requirement is to teach the athlete not to stop at the finish line, but to continue running beyond it. This serves not only a technical purpose but also a volitional-training objective by reinforcing the ability to maintain velocity through the end of the race.

Technical errors and their individualized correction.

When teaching sprint technique, merely identifying an error is insufficient. It is necessary to determine its probable cause, select an appropriate corrective exercise, and reassess performance. The teaching manual provides practical corrective measures for excessive forward or backward trunk lean, tension in the shoulders and arms, insufficient or excessive thigh lift, outward rotation of the feet, premature trunk elevation during the start, and other common errors [1].

Table 1.

Major technical errors in short-distance running and approaches to their correction

Technical error	Probable consequence	Corrective approach
Excessive forward trunk lean	Disruption of balance and freedom of movement	Direct the gaze 10–15 m ahead; normalize head and trunk position
Backward trunk lean	Reduced efficiency of forward-directed movement	Bring the shoulders slightly forward; direct the gaze ahead
Tension in the shoulders and arms	Disruption of rhythm and coordination	Relax the shoulders and free the arm action
Insufficient thigh lift	Reduced stride effectiveness	Control thigh action during specific running drills
Excessively high thigh lift	Reduced forward displacement	Direct the movement forward rather than upward
Outward rotation of the feet	Disruption of the direction of propulsion	Controlled running along a straight line
Premature trunk elevation at the start	Reduced effectiveness of initial acceleration	Start beneath an inclined rail or from a one-hand-supported position
Excessive upward lift of the leg on the first step	Reduced forward-directed impulse	Move the foot forward along a trajectory close to the ground
Abrupt lifting of the head	Premature elevation of the trunk	Keep the chin relatively close to the chest and control head position

The general principle underlying the corrective approaches presented in the table is that pedagogical instruction should be reinforced by a specific exercise. For example, premature trunk elevation may be constrained through the use of an inclined obstacle, whereas outward rotation of the feet may be addressed by controlled running along a narrow, straight path. Such an approach transforms instruction into a feedback-based process.

Improved model for teaching short-distance running technique

INITIAL ASSESSMENT

↓

DEVELOPING A CONCEPTUAL UNDERSTANDING OF TECHNIQUE

↓

ESTABLISHING THE FOUNDATIONS OF RELAXED RUNNING

↓

CROUCH START AND START ACCELERATION

↓

TRANSITION TO RUNNING OVER THE DISTANCE

↓

TECHNICAL STABILITY AT MAXIMAL VELOCITY

↓

FINISHING

↓

PEDAGOGICAL AND TECHNICAL MONITORING

↓

IDENTIFICATION OF THE ERROR AND ITS CAUSE

↓

INDIVIDUALIZED CORRECTIVE EXERCISE

↓

REASSESSMENT

↓

REFINEMENT OF THE COMPLETE SPRINT TECHNIQUE

Figure 1. Progressive model for teaching and individually correcting short-distance running technique

Scientific novelty of the study

The process of teaching short-distance running technique was systematized not merely as the sequential acquisition of the start, start acceleration, running over the distance, and finishing, but as a feedback mechanism comprising “technique development – pedagogical monitoring – identification of technical errors – individualized correction – reassessment.” A methodological algorithm was proposed for the differentiated selection of specific exercises corresponding to individual phases of sprinting and linked to each learner’s specific technical deficiencies.

Practical significance

The proposed methodological model can be applied in physical education lessons in general secondary schools, initial training groups in sports schools, track-and-field training, and professional development programs for physical education teachers and coaches. The model enables teachers and coaches to evaluate technical preparedness not only by final sprint time but also by the quality of individual movement phases and the dynamics of technical errors.

Conclusion

1. Effective teaching of short-distance running technique requires the start, start acceleration, running over the distance, and finishing to be developed as an integrated and interrelated movement system.

2. When teaching the crouch start, establishing the correct technical structure of the movement before increasing response speed to the signal and execution velocity reduces the risk of stabilizing erroneous movement patterns.

3. During the transition from start acceleration to running over the distance, maintaining velocity while preserving freedom of movement and reducing excessive muscular tension is an important methodological task; relaxed inertial and variable running exercises are appropriate for this purpose.

4. Rather than prioritizing maximal-intensity running before technique is sufficiently developed, a progressive transition from submaximal, controlled running to maximal velocity contributes to the stable acquisition of technical skills.

5. Resisted sprint exercises are a promising supplementary means, particularly for developing initial acceleration; however, their effectiveness depends on resistance magnitude, sprint phase, and the athlete’s training status [3–5].

6. Correcting technical errors requires more than recording their external manifestation; the cause of the error should be identified and a corresponding specific exercise selected.

7. The algorithm “technique development – monitoring – error identification – individualized correction – reassessment” transforms the teaching process into a controlled feedback system.

8. Contemporary coordination-based perspectives support the development of individual and functionally effective movement solutions within fundamental biomechanical requirements rather than forcing athletes into a single rigid “ideal” technical template [10].

9. The proposed methodological model can be used to systematically teach, monitor, and individually refine short-distance running technique in physical education and sports training practice.

References:

1. Mamadaliyev A.A. Yengil atletikani oʻrgatish uslubiyati [Methodology of Teaching Track and Field]: teaching manual. – Tashkent: Umid design, 2026. – 170 p.

2. Valamatos M.J., Abrantes J.M., Carnide F., Valamatos M.-J., Monteiro C.P. Biomechanical Performance Factors in the Track and Field Sprint Start: A Systematic Review // International Journal of Environmental Research and Public Health. - 2022. - Vol. 19, No. 7. - Art. 4074. DOI: 10.3390/ijerph19074074.

3. Aldrich E.K., Sullivan K., Wingo J.E., Esco M.R., Leeper J., Richardson M.T., Winchester L.J., Fedewa M.V. The Effect of Resisted Sprint Training on Acceleration: A Systematic Review and Meta-Analysis // International Journal of Exercise Science. - 2024. - Vol. 17, No. 6. - P. 986-1002. PMID: 39253367.

4. Myrvang S., van den Tillaar R. The Longitudinal Effects of Resisted and Assisted Sprint Training on Sprint Kinematics, Acceleration, and Maximum Velocity: A Systematic Review and Meta-analysis // Sports Medicine - Open. - 2024. - Vol. 10. - Art. 110. DOI: 10.1186/s40798-024-00777-7.

5. Xu K., Jukic I., Cross M.R., Hicks D.S. et al. Effects of Resisted-Sprint Training on Sprint Performance and Mechanics: A Systematic Review and Meta-Analysis Focusing on Load Magnitude // Scandinavian Journal of Medicine & Science in Sports. - 2025. - Vol. 35, No. 12. - e70182. DOI: 10.1111/sms.70182.

6. Wild J.J., Bezodis I.N., North J.S., Bezodis N.E. Enhancing the Initial Acceleration Performance of Elite Rugby Backs. Part II: Insights From Multiple Longitudinal Individual-Specific Case-Study Interventions // International Journal of Sports Physiology and Performance. - 2023. - Vol. 18, No. 9. - P. 1019-1029. DOI: 10.1123/ijspp.2023-0091.

7. Bashir M., Soh K.G., Samsudin S., Akbar S., Luo S., Sunardi J. Effects of Functional Training on Sprinting, Jumping, and Functional Movement in Athletes: A Systematic Review // Frontiers in Physiology. - 2022. - Vol. 13. - Art. 1045870. DOI: 10.3389/fphys.2022.1045870.

8. Silva A.F., Ramirez-Campillo R., Ceylan H.I., Sarmento H., Clemente F.M. Effects of Maturation Stage on Sprinting Speed Adaptations to Plyometric Jump Training in Youth Male Team Sports Players: A Systematic Review and Meta-Analysis // Open Access Journal of Sports Medicine. - 2022. - Vol. 13. - P. 41-54. DOI: 10.2147/OAJSM.S283662.

9. Nicholson B., Dinsdale A., Jones B. et al. The Training of Medium- to Long-Distance Sprint Performance in Football Code Athletes: A Systematic Review and Meta-analysis // Sports Medicine. - 2022. - Vol. 52. - P. 257-286. DOI: 10.1007/s40279-021-01552-4.

10. Hicks D.S., McMillan S., Schöllhorn W., van den Tillaar R. Sprint Running Coordination: A Dynamical Systems Perspective // Sports Medicine. - 2026. - Vol. 56, No. 3. - P. 651-675. DOI: 10.1007/s40279-025-02380-6.