



Improving Long-Pass Performance in Youth Football Players Through the BLAST Training Model

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Abstract

Background. The long-pass kicking technique is a fundamental skill in football that can significantly influence match dynamics and contribute to team success. However, this technique remains a major challenge for youth football athletes, as it is often insufficiently emphasized in training programs. Therefore, an effective and structured training model is needed to improve long-pass performance.

Objectives. This study aimed to examine the effectiveness of the BLAST training model in improving long-pass kicking technique among youth football athletes.

Materials and Methods. This study employed a quasi-experimental design with a pretest–posttest control group approach. A total of 50 participants were divided into an experimental group ($n = 25$), which received the BLAST training model, and a control group ($n = 25$), which underwent conventional training provided by their coaches. The Rumi long-pass test was administered during both the pre-test and post-test to assess performance. Data were analyzed using descriptive statistics, the Shapiro–Wilk normality test, Levene's test of homogeneity, ANCOVA, independent samples t-tests, and N-gain score analysis.

Results. The findings revealed that both groups showed improvements in long-pass kicking performance after the intervention. However, the experimental group demonstrated significantly greater improvement than the control group ($p < 0.05$). The experimental group achieved an average N-gain score of 62.56% (moderately effective), whereas the control group reached only 22.99% (low effectiveness).

Conclusions. The results indicate that the BLAST training model is more effective than conventional training methods in improving long-pass kicking technique among youth football athletes.

Keywords: BLAST model, long-pass kicking, football training, youth athletes, skill development.

Introduction

Football is one of the most widely played and globally popular sports, characterized by complex interactions between technical skills, tactical strategies, and team coordination. Team success is closely linked to players' technical proficiency and the effectiveness of structured training programs that support optimal performance. As a collective sport, football requires continuous interaction among players to achieve shared objectives (Baroni et al., 2020), where individual technical skills directly influence overall team performance (Kvas-Cabral et al., 2022).

Among fundamental technical skills, kicking plays a central role in determining both individual and team effectiveness. In particular, passing is a dominant component of gameplay, functioning not only to maintain possession but also to connect defensive and offensive phases (Burcak, 2015). Passing can be broadly categorized into short and long passes, each serving distinct tactical purposes (Marsyanurdin et al., 2023). Previous studies have demonstrated a strong relationship between passing activity and team success, with passing accuracy identified as a key determinant of technical performance (Belete, 2023).

Long passes, although less frequently used than short passes, have strategic importance in creating scoring opportunities, especially in counterattacks or when breaking defensive lines (Cordón-Carmona et al., 2023). They are

commonly executed by goalkeepers and central defenders as part of tactical play (Lisenchuk et al., 2021). Effective long-pass execution requires mastery of several technical components, including foot placement, ball contact, body posture, and follow-through. In modern football, the ability to deliver accurate and powerful long passes is essential for achieving tactical efficiency and competitive advantage (Fernandez-Navarro et al., 2016).

Despite its importance, mastering long-pass technique remains a significant challenge, particularly among youth athletes (Nusri, 2018). Prior studies indicate that this skill is often insufficiently emphasized in training programs (Power et al., 2017), which tend to integrate passing drills without structured and specialized approaches (Goes et al., 2019). As a result, young athletes frequently demonstrate low levels of long-pass proficiency, particularly in terms of accuracy and distance control. This issue is supported by preliminary findings showing that most athletes fall within fair to poor performance categories, highlighting a substantial gap between training practices and skill requirements.

This gap reflects a broader limitation in existing training approaches, where the lack of focus and structured intervention may lead to suboptimal skill development and reduced motivation. Effective training programs should be designed based on systematic principles, incorporating both technical and physiological aspects to enhance performance outcomes (Paixão et al., 2015). Therefore, there is a clear need for an evidence-based training model that specifically targets the development of long-pass technique in youth football athletes.

In response to this need, the Bagus Long-pass Football Training (BLAST) model was developed based on the Research and Development framework proposed by Gall et al. (1996). This model is designed to stimulate physiological adaptation through the overcompensation principle

while simultaneously improving technical execution during training. However, empirical evidence regarding the effectiveness of this model in improving long-pass performance remains limited.

Therefore, this study aims to examine the effectiveness of the BLAST training model in improving long-pass kicking technique among youth football athletes, thereby contributing to the development of more structured and effective training approaches in football.

Materials and Methods

Study Participants

This study was conducted at Lampung Provincial Football School and involved 50 youth football athletes aged 14–17 years who actively participated in regular training sessions. Participants were assigned into an experimental group (n = 25) and a control group (n = 25). All participants provided informed consent prior to participation. Ethical approval was obtained from State University of Jakarta (No. 47/UN39.14/PT.01.05/I/2026).

Study Design and Procedures

This study employed a quasi-experimental design using a pretest–posttest control group approach. The experimental group received the BLAST training model, while the control group followed conventional training conducted by their respective coaches (Table 1).

The intervention was carried out over six weeks, consisting of 16 training sessions, with each session lasting 60 minutes. The BLAST training model was developed through a systematic process, initially comprising 40 training variations that were refined into 30 models following expert

Table 1. Blast Training Program Protocol (High-Level Design)

Session	Training Models	Distance	Sets	Repetitions	Duration (min)	Intensity (RPE)	Rest Interval	Progression
1	M3, M4, M17, M29	15–25 m	3	8–10	60	5–6 (Moderate)	60–90 sec	Technical adaptation
2	M5, M6, M18, M30	15–25 m	3	8–10	60	5–6 (Moderate)	60–90 sec	Technical adaptation
3	M9, M10, M19	15–20 m	3	10–12	60	6 (Moderate)	60 sec	Volume increase
4	M14, M15, M20	20 m	3	10–12	60	6 (Moderate)	60 sec	Stability phase
5	M16, M18, M19, M35	20–25 m	4	8–10	70	6–7 (Moderate–High)	60 sec	Load progression
6	M15, M20, M23, M36	20–25 m	4	8–10	70	6–7 (Moderate–High)	60 sec	Load progression
7	M14, M24, M25, M37	20–25 m	4	8–10	70	6–7 (Moderate–High)	60 sec	Load progression
8	M13, M26, M27, M38	20–25 m	4	8–10	70	6–7 (Moderate–High)	60 sec	Load progression
9	M3, M28, M39	15–25 m	4	10–12	75	7 (High)	45–60 sec	Intensity increase
10	M4, M27, M18, M40	15–25 m	4	10–12	75	7 (High)	45–60 sec	Intensity increase
11	M5, M26, M19, M30	15–25 m	4	10–12	75	7 (High)	45–60 sec	Intensity increase
12	M6, M25, M20, M33	15–25 m	4	10–12	75	7 (High)	45–60 sec	Intensity increase
13	M9, M24, M35, M3	15–20 m	4	10–12	80	7–8 (High)	45 sec	Performance phase
14	M10, M23, M36, M5	15–20 m	4	10–12	80	7–8 (High)	45 sec	Performance phase
15	M9, M24, M37, M9	15–20 m	4	10–12	80	7–8 (High)	45 sec	Performance phase
16	M10, M23, M39, M14	15–20 m	4	10–12	80	7–8 (High)	45 sec	Performance phase
17	M9, M24, M40	15–20 m	3	12–15	75	8 (Very High)	30–45 sec	Peak phase
18	M10, M23, M20, M26	15–20 m	3	12–15	75	8 (Very High)	30–45 sec	Peak phase

Note: M = Model, RPE = Rate of Perceived Exertion (scale 1–10), Program duration = 18 sessions, Frequency = 3 sessions/week (recommended), Each session includes warm-up (10–15 min) and cool-down (5–10 min)

judgment evaluation. The expert validation involved football coaching specialists with experience in technical training development. The model was structured progressively based on passing distance to enhance technical adaptation and performance.

The validity of the instrument was assessed using the corrected item–total correlation method. The results indicated that all items across the pre-test and post-test in both experimental and control groups had correlation coefficients exceeding the critical value ($r_{table} = 0.396$, $n = 25$, $\alpha = 0.05$). Therefore, all items were considered valid and suitable for measuring long-pass performance (Table 2).

Table 2. Item Validity Results

Group	Item	r-value	r-table	Decision
Pre-Test Experimental	Test 1	0.60	0.396	Valid
	Test 2	0.56	0.396	Valid
	Test 3	0.62	0.396	Valid
	Test 4	0.58	0.396	Valid
	Test 5	0.64	0.396	Valid
Post-Test Experimental	Test 1	0.73	0.396	Valid
	Test 2	0.70	0.396	Valid
	Test 3	0.75	0.396	Valid
	Test 4	0.72	0.396	Valid
	Test 5	0.76	0.396	Valid
Pre-Test Control	Test 1	0.55	0.396	Valid
	Test 2	0.53	0.396	Valid
	Test 3	0.59	0.396	Valid
	Test 4	0.56	0.396	Valid
	Test 5	0.61	0.396	Valid
Post-Test Control	Test 1	0.65	0.396	Valid
	Test 2	0.62	0.396 </td <td>Valid</td>	Valid
	Test 3	0.67	0.396	Valid
	Test 4	0.63	0.396	Valid
	Test 5	0.69	0.396	Valid

The reliability of the instrument was evaluated using Cronbach’s Alpha. The results demonstrated high to excellent internal consistency, with Cronbach’s Alpha values of 0.86 for the pre-test experimental group, 0.91 for the post-test experimental group, 0.84 for the pre-test control group, and 0.88 for the post-test control group. These findings confirm that the instrument is both valid and reliable for assessing long-pass kicking performance among youth football athletes (Table 3).

Table 3. Reliability Test Results

Group	Cronbach’s Alpha	Interpretation
Pre-Test Experimental	0.86	High Reliability
Post-Test Experimental	0.92	Excellent Reliability
Pre-Test Control	0.83	High Reliability
Post-Test Control	0.87	High Reliability

Both groups underwent pre-test and post-test using the Rumi Long Pass Test to measure long-pass accuracy (Doewes et al., 2022). Each participant performed five long-pass attempts toward a designated target area. The testing procedure involved three officials responsible for start coordination, target supervision, and score recording. Scoring was based on accuracy within concentric target zones: 50 points (≤ 1 m), 40 points (2 m), 30 points (3 m), 20 points (4 m), and 10 points (5 m) (Fig. 1).

Statistical Analysis

Data were analyzed using descriptive statistics and inferential tests at a significance level of 0.05. The Shapiro–Wilk test and Levene’s test were used to assess normality and homogeneity assumptions, respectively. Paired sample t-tests were applied to examine within-group differences, while independent sample t-tests were used to compare between-group differences. In addition, N-gain analysis was conducted to evaluate the effectiveness of the intervention. All statistical analyses were performed using SPSS version 25.

Results

The effectiveness of the BLAST training model was evaluated by comparing pre-test and post-test results between the experimental and control groups. The descriptive statistics are presented in Table 4.

Table 4. Descriptive Statistics of Long-Pass Performance

Group	N	Min	Max	Mean	SD
Pre-test (Experimental)	25	100	170	139.60	18.59
Post-test (Experimental)	25	150	220	189.20	18.01
Pre-test (Control)	25	100	170	138.00	18.03
Post-test (Control)	25	130	190	157.20	14.87

As shown in Table 4, both groups demonstrated improvements in long-pass performance after the intervention.

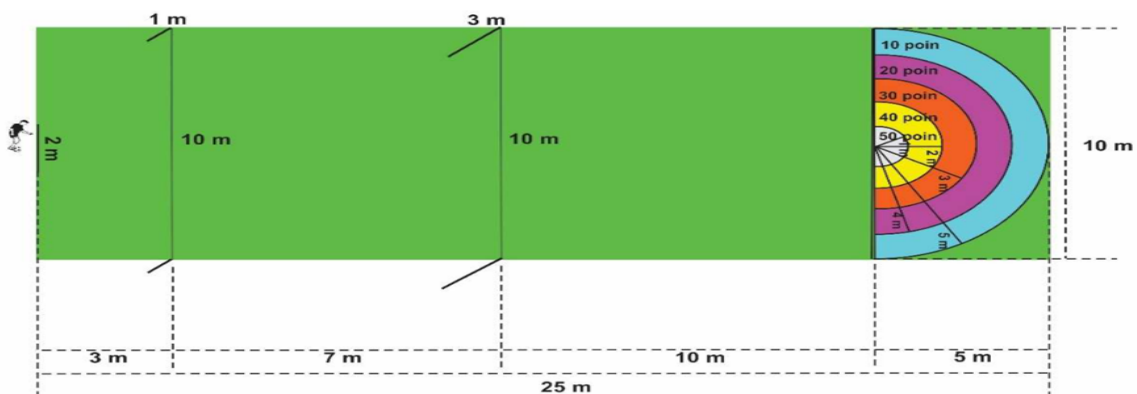


Fig. 1. Rumi Long Pass Test

However, the increase in the experimental group was substantially higher compared to the control group.

Prior to hypothesis testing, normality and homogeneity assumptions were examined. The results in Table 5 indicated that the data were normally distributed and homogeneous ($p > 0.05$), fulfilling the requirements for parametric analysis.

Table 5. Normality Test (Shapiro–Wilk)

Variable	N	Sig.
Pre-test (Experimental)	25	>0.05
Post-test (Experimental)	25	>0.05
Pre-test (Control)	25	>0.05
Post-test (Control)	25	>0.05

The Levene’s test result in Table 6 ($p = 0.699$) confirmed that the variance between groups was homogeneous.

Table 6. Homogeneity Test (Levene’s Test)

Variable	F	Sig.
Long-pass	0.152	0.699

Hypothesis testing using independent sample t-test showed a significant difference between the experimental and control groups after the intervention ($p < 0.05$). The results indicate that the BLAST training model produced a significantly greater improvement in long-pass kicking performance compared to conventional training.

Table 7. ANCOVA Results

Source	SS	df	MS	F	Sig.
Pre-test (Covariate)	2150.32	1	2150.32	9.87	0.003
Group	7420.55	1	7420.55	34.62	0.000
Error	10078.44	47	214.44		

The ANCOVA results revealed a significant effect of group on post-test long-pass performance ($F = 34.62$, $p < 0.001$), indicating that the experimental group performed significantly better than the control group after controlling for pre-test scores. To further examine the magnitude of the effect, Cohen’s d was calculated. The analysis showed a large effect size ($d = 1.92$), indicating a substantial practical impact of the BLAST training model. Additionally, the 95% confidence interval (CI) for the mean difference ranged from 22.50 to 41.50, confirming the robustness of the observed effect.

For comparison purposes, an independent samples t-test was also conducted, which showed a significant difference between groups ($t = 6.852$, $df = 48$, $p < 0.001$), with a mean difference of 32.00.

Table 8. Independent Sample t-Test Results

Variable	t	df	Sig. (2-tailed)	Mean Difference
Long-pass	6.852	48	0.000	32.00

To further assess the effectiveness of the intervention, N-gain analysis was conducted, as presented in Table 9.

Table 9. N-Gain Score Results

Group	Mean (%)	Min (%)	Max (%)	Category
Experimental Group	62.56	29.70	98.36	Moderately Effective
Control Group	22.99	12.35	49.18	Low Effectiveness

The N-gain results show that the experimental group achieved a higher improvement level (62.56%) compared to the control group (22.99%). This indicates that the BLAST training model is more effective in enhancing long-pass kicking technique among youth football athletes.

Discussion

The results of this research provide strong empirical evidence that the BLAST training model is not only possible but also much more successful than conventional training techniques when it comes to enhancing the performance of youth football players in terms of long pass kicking. The experimental group showed a much improvement (62.56% compared to 22.99%) in post-test mean scores and N-Gain values, indicating that training that is structured and consistently planned achieves better performance results. In addition to showing effectiveness these results show a system of learning processes that controls the occurrence of such changes.

Mechanistically speaking, the BLAST model’s effectiveness is explicable in terms of how one acquires motor skills. Structured repetition, increasing task complexity, and continuous feedback are all components of the paradigm that work together to help with neuromuscular adaptation but also stabilise movements (Kaliukhovich et al., 2013; Kenefick et al., 2018; Wang et al., 2024). High involvement and swift mistake correction help athletes quickly go from cognitive knowledge to fundamental coordination in early training. Training moves toward the associative stage, when consistency and efficiency of movement are developed, and improvements become more gradual as a result. This sequential learning process explains why the experimental group outperformed the control group, who did not receive any structured feedback or development, and maintained their superior performance over time. Accordingly, the discrepancies are more than simply statistical; they point to a real causal process with its origins in the design of structured learning.

However, the BLAST model should not be viewed as a static training approach; rather, it should be interpreted as a dynamic element whose functional role develops during the process of learning. At the beginning, BLAST is mostly used to generate stimuli, which speed up the acquisition of motor skills and the correction of errors via systematic repetition and instant feedback. As athletes go into the intermediate stage, BLAST takes on a stabilising function, helping to ensure that their movements are consistent and that their performance is less variation. This is achieved by controlled task progression. Excessive repetition without increasing complexity might inhibit further adaptation in subsequent phases, thus it is necessary to change the same structure to avoid this limitation. The BLAST model’s effectiveness varies from one athlete’s developmental stage to another, and this variation is explained by this functional transformation.

Because this procedure is time-dependent, we now know exactly when to use the BLAST model. Athletes are most receptive to technical adjustments and learning via repetition in the early and middle stages of training, when they experience the biggest performance increases (Quinzi et al., 2016). The need for more complicated and context-driven training stimuli arises because the pace of progress

inevitably decreases with increasing skill levels. This suggests that the BLAST model works best for young players when they are still growing into their sport, when fundamental technical abilities like long passing are very adaptable. Conventional training methods, on the other hand, miss this crucial opportunity since they rarely incorporate focused growth (Deuker et al., 2024).

The temporal performance limitations of the BLAST model provide for a more exact understanding of the effectiveness of the model. This is most noticeable when athletes are still in the early to mid-stages of their training and are very receptive to feedback and structured repetition. A steady pace of advancement indicates a shift toward more consistent and sophisticated execution, which occurs naturally as skill learning advances (Vanderka et al., 2020). If training stimuli are not well modified or athletes reach a performance plateau, especially at advanced levels when tactical and environmental elements become more important, the impact could decrease. The BLAST model's effectiveness changes with time as a result of interactions between training plan, athlete development stage, and the progress of learning stimuli, as seen by this dynamic pattern.

Additionally, the functional transformation accomplished by the BLAST model is explained by this system-level interpretation. The BLAST system organises training sessions that were previously unstructured, which is a significant improvement over conventional approach. As a result of this change, players gain self-assurance, consistency, and pinpoint precision while passing the ball long distances. When training design, learning processes, and performance results are well linked, as is the case in the experimental group, the effectiveness of this transformation process is reflected in the much larger N-Gain.

Nevertheless, this system's effectiveness is conditional and not applicable in all cases. Athletes in the process of skill development benefit most from the application of the model in supervised training settings with regular exposure. For more experienced players, when tactical complexity and decision-making matter more than technical progress alone, its effect may be less noticeable (Lex et al., 2015). These limits show that the BLAST model may not always be applicable to every situation; rather, its performance depends on how training design and contextual elements interact with one another.

When seen from a tactical point of view, the expansion of game tactics may also be connected to the increase in long pass performance (Wu, 2022). Direct play, which prioritises quick ball advancement and effective use of space, relies heavily on long passing (Tenga et al., 2010). Teams may avoid midfield pressure and adjust to possession-dominant opponents with better long pass execution (Fernandez-Navarro et al., 2016). Thus, the BLAST method improves tactical flexibility and performance beyond skill development.

The statistical findings provide further support for these notions. The intervention effect is confirmed to be resilient by the substantial differences seen in independent t-tests ($p < 0.05$) and the improvements shown in paired sample analyses. Crucially, the N-Gain analysis differentiates between structured and unstructured training results, offering more insight into the effectiveness of learning. Conventional approaches do not achieve the same level of learning efficiency as the BLAST model, which optimises

the interaction between training variables. This discrepancy may be explained by different levels of system structure. These results are in line with previous studies that found a correlation between good passing and better attacking results (Rein et al., 2017).

A transparent decision rule was implemented across several performance measures to guarantee a uniform interpretation of the outcomes. N-Gain was considered the main statistic for effectiveness since it shows how much learning improved compared to starting performance levels. The observed differences were not attributed to random changes, as shown by statistical significance ($p < 0.05$) from t-tests. The convergence of these indicators allowed us to draw the final conclusion on the BLAST model's performance. We found that there were statistically significant changes, and the N-Gain values were moderate to high, which indicates a substantial and practically important improvement. By using this method, it is ensured that the findings are not constructed merely on the basis of statistical results, but rather on the basis of an integrated assessment of both the significance and the learning effect.

The research provides a system-based training model that has been verified and is ready for direct use by coaches and practitioners, which is a practical implication. Effective learning environments that speed up skill acquisition may be created using the BLAST model, which integrates progression, repetition, and feedback into an integrated framework. Since football performance is complicated and arises from the interplay of technical, tactical, and situational elements, this is especially pertinent (Delibas et al., 2019; Estephan et al., 2017). In addition to enhancing technical performance, coaches may use this approach to better match training methods with overall performance goals.

It is important to recognise a number of limitations notwithstanding these achievements. This research does not require contextual factors like player placement, opponent pressure, and in-game decision-making into account; instead, it mainly looks at the technical parts of long passing. Because technical execution and tactical context combine to produce real-game effectiveness, this is just a partial representation of performance from a systemic viewpoint. More integrative methods that capture both technical and contextual aspects of performance should be used in future research, according to recent innovations like the passing disruptiveness notion (Goes et al., 2021).

It is beneficial for future studies to investigate if the training can be maintained over time. The impact of structured training methods on real-game performance may be better understood with continuous integration of physical, technical, and tactical analysis which remains essential for advancing both theoretical development and practical application in football training (Andrzejewski et al., 2018).

Conclusion

At the early to intermediate stages of skill development, when motor learning and performance improvement are most facilitated by structured repetition and progressive task design, this study shows that the BLAST-based long pass training model works well for youth football players. Both statistical significance and N-Gain analysis show that the model outperforms traditional training under these

circumstances, demonstrating meaningful and practically relevant learning results.

BLAST model effectiveness depends on training situation and athlete development stage. For highly skilled players, the importance of tactical complexity decision-making, and contextual adaptability over technical repetition to increase performance may diminish. Furthermore, the current investigation has limitations due to its exclusive emphasis on technical performance, which does not adequately account for tactical and situational factors that impact actual game effectiveness.

Accordingly, the effectiveness of the BLAST model needs to be understood within a controlled environment, whereby the training plan, athlete attributes, and performance metrics are matched appropriately. The concept works best as a structured learning system during certain developmental periods, not as a general training solution. This paradigm should be expanded by adding tactical, contextual, and match-based performance indicators to better assess effectiveness of training.

Ethics Approval

This study was conducted in accordance with established ethical standards. Ethical approval was granted by The State University of Jakarta (No. 47/UN39.14/PT.01.05/I/2026) prior to data collection, and all procedures involving human participants complied with institutional and international guidelines.

Informed Consent

Informed consent was obtained from all participants involved in this study. For participants under the age of 18, consent was obtained from their parents or legal guardians, along with participant assent where appropriate.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

AI Transparency Statement

The authors used AI-assisted tools for language editing only and take full responsibility for the content of this manuscript.

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Conflicts of Interest

The authors declare no conflicts of interest.

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Удосконалення виконання довгого пасу у юних футболістів засобами тренувальної моделі BLAST

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Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; E – збір коштів

Реферат. Стаття: 8 с., 9 табл., 1 рис., 28 джерел.

Актуальність. Техніка довгого пасу є однією з базових навичок у футболі, яка може суттєво впливати на динаміку гри та сприяти успіху команди. Однак ця техніка залишається серйозною проблемою для юних футболістів, оскільки їй часто приділяється недостатньо уваги у тренувальних програмах. Тому існує потреба в ефективній та структурованій моделі тренування для вдосконалення виконання довгого пасу.

Мета дослідження. Метою дослідження було вивчити ефективність тренувальної моделі BLAST у вдосконаленні техніки виконання довгого пасу у юних футболістів.

Матеріали і методи. У дослідженні застосовано квазіекспериментальний дизайн із підходом «передтест–післятест» із контрольною групою. Загалом у дослідженні взяли участь 50 спортсменів, яких було розподілено на експериментальну групу (n = 25), що тренувалася за моделлю BLAST, та контрольну групу (n = 25), яка проходила традиційне тренування під керівництвом тренерів. Для оцінювання результатів під час передтесту та післятесту використовувався тест довгого пасу Rumi. Дані аналізували за допомогою описової статистики, тесту Шапіро–Вілка на нормальність розподілу, тесту Левена на однорідність дисперсій, ANCOVA, t-тестів для незалежних вибірок та аналізу N-gain.

Результати. Результати показали, що після втручання обидві групи продемонстрували покращення техніки виконання довгого пасу. Однак експериментальна група продемонструвала статистично значуще більше покращення порівняно з контрольною групою ($p < 0.05$). Середній показник N-gain в експериментальній групі становив 62.56% (помірна ефективність), тоді як у контрольній групі — лише 22.99% (низька ефективність).

Висновки. Отримані результати свідчать про те, що тренувальна модель BLAST є ефективнішою за традиційні методи тренування у вдосконаленні техніки виконання довгого пасу у юних футболістів.

Ключові слова: модель BLAST, довгий пас, футбольне тренування, юні спортсмени, розвиток навичок.

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