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Application of Scanning Towards Passing Accuracy in Football

Muhamad Ryan Nugraha[1], Yadi Sunaryadi[2]✉, Widi Kusumah[3]

Program Studi Pendidikan Kepelatihan Olahraga, Fakultas Pendidikan Olahraga dan Kesehatan, Universitas Pendidikan Indonesia, Jalan Dr. Setiabudhi No. 229, Bandung, Jawa Barat, 40154, Indonesia[123]

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Abstract

This study investigated the effect of integrating scanning into a diamond passing training program on the passing accuracy of U13 football players at SSB Saswco FC Bandung. We used a quantitative quasi-experimental method with a one-group pretest–posttest design. Total sampling was used to choose all 20 eligible 13-year-old players. Prior to and following a four-week intervention (three sessions per week for sixty minutes each), passing performance was evaluated using the Loughborough Soccer Passing Test (LSPT). We used a paired-samples t-test, the Shapiro-Wilk normality test, and effect size computation to compare pretest and posttest results. The results showed that as LSPT scores decreased from the pretest ($M = 64.10$, $SD = 5.04$) to the posttest ($M = 60.90$, $SD = 4.13$), passing performance improved. The paired-samples t-test showed a significant improvement following the intervention ($t(19) = 8.587$, $p < 0.001$) with a very large effect (Cohen's $dz \approx 1.92$), and the normalcy assumptions were satisfied. The paired-samples t-test showed a significant improvement following the intervention, $t(19) = 8.587$, $p < 0.001$, with a very large effect (Cohen's $dz \approx 1.92$), and the normality assumptions were satisfied. These findings suggest that embedding scanning cues within diamond passing drills is an effective approach to enhance passing performance in youth players by combining technical execution with perceptual–cognitive decision-making demands.

How to Cite

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✉ Correspondence Author:
E-mail: ydsunaryadi@upi.edu

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INTRODUCTION

Football is one of the most popular sports in the world, and to meet contemporary match standards, players must possess technical, tactical, physical, and cognitive abilities (Habekost, T., Ovesen, J., & Madsen, 2024; Williams, A. M., Thomas, J. L., Jordet, G., & Ford, 2023). Recent data shows that young players are getting worse at passing, especially when the game is fast and there is a lot of pressure (McGuckian, T. B., Beavan, A., Mayer, J., Chalkley, D., & Pepping, 2020). One big reason why passes are less accurate and decisions take longer is that players don›t look around enough before getting the ball. Passing accuracy is still a big problem. Even at the professional level, more than 20–30% of passes can still be wrong (Lago-Peñas, C., Lago-Ballesteros, J., Dellal, A., & Gómez, 2010). Passing accuracy is the skill of a player to throw the ball to a teammate with the right amount of speed, force, and timing (Azmi, A., Kridasuwarso, B., & Fachrezzy, 2024).

Two things that are very important for good match results are having the ball and getting chances to score. Scanning makes you look at the field before, during, and after you get the ball. This helps you make better decisions and be more aware of what›s going on around you(Roca, A., Ford, P. R., & Memmert, 2021). Diamond passing drills, which have four players in a diamond shape, are often used to help players get better at making passes that are more accurate, faster, and different in different situations. Experimental results indicate that diamond passing training markedly improves passing accuracy compared to other passing patterns, while prior research indicates that players who engage in more frequent scanning are predisposed to greater passing success (Manik, S., & Tarigan, 2022).

However, much of the current research continues to address technical and cognitive dimensions separately, potentially hindering the transfer of skills to real match situations (Oppici, L., Panchuk, D., Serpiello, F. R., & Farrow, 2018). There is still very little research on structured protocols that deliberately include scanning cues in diamond passing practice, even though scanning and diamond passing have been studied separately. Consequently, this study advocates for an integrative training methodology by incorporating scanning instructions into a diamond passing drill and assessing its influence on passing accuracy in dynamic gameplay (Jordet, G., Aksum, K. M., Pedersen, D. N., Walvekar, A., Trivedi, A., McCall, A., Ivarsson, A., & Priestley, 2020)

This research contributes to football training methodology by offering a combined technical–cognitive model that can guide coaches and practitioners in improving passing performance more comprehensively. The purpose of this study is to examine the effect of integrating scanning instructions into a diamond passing training program on passing accuracy in U13 football players.

METHOD

This study used a quasi-experimental quantitative approach to examine whether applying scanning can improve football passing accuracy. A quasi-experimental method was chosen because the field setting did not allow the use of a control group, yet the study still required objective measurement and systematic procedures. The research design utilized a one-group pretest–posttest methodology, assessing a single group prior to and following the intervention to detect variations in the dependent variable (passing accuracy) (Syahputri, A. Z., Fallenia, F. D., & Syafitri, 2023). In this design, O1 is the pretest using the Loughborough Soccer Passing Test (LSPT), X is the intervention based on scanning that is given through diamond passing training, and O2 is the posttest using the same LSPT (Ali, A., Williams, C., Hulse, M., Strudwick, A., Reddin, J., Howarth, L., Eldred, J., Hirst, M., & McGregor, 2007)

The participants were active 13-year-old players who were registered at SSB Saswco FC Bandung and regularly trained and competed with each other. Total sampling was used for the sample, which meant that all eligible players who met the inclusion criteria and were exactly 13 years old were included (Syahputri, A. Z., Fallenia, F. D., & Syafitri, 2023). This method reduced selection bias and facilitated a more precise understanding of the situation. This means that the changes in performance were mostly caused by the intervention and not by differences in the participants' traits, especially since the sample was pretty similar.

The study used the Loughborough Soccer Passing Test (LSPT). It is a standardized test that sees how quickly and accurately you can pass the ball in game-like situations. Some of the 16 passes were short ones to red and white targets that were about 3.5 meters away, and some were longer ones to green and blue targets that were about 4 meters away (Ali, A., Williams, C., Hulse, M., Strudwick, A., Reddin, J., Howarth, L., Eldred,

J., Hirst, M., & McGregor, 2007). The process included scanning by having an assessor call out the color of the next target right after the ball was played. This forced participants to quickly scan, find the target, and choose the next pass (McGuckian, T. B., Cole, M. H., & Pepping, 2018)

For the example, Schematic illustration of the Loughborough Soccer Passing Test (LSPT) with integrated scanning cues, illustrates the LSPT setup consisting of four colored targets (red, white, green, and blue). Short passes are directed to red and white targets at approximately 3.5 m, while longer passes are directed to green and blue targets at approximately 4 m. During the test, an assessor verbally announces the next target color immediately after each pass, requiring the participant to perform rapid scanning, identify the correct target, and execute the next pass under time pressure.

A stopwatch was used to measure the time from the first ball movement to the last pass reaching the target area. Separate assessors kept track of penalties to keep things fair and consistent (McDermott, G., Burnett, A. F., & Robertson, 2015).

The intervention included a four-week diamond passing program based on scanning, with three 60-minute sessions each week. Players practiced in a diamond shape, where they had to look around before and after getting the ball and throwing it. This was done to make the connection between perceptual–cognitive scanning and technical passing execution stronger (Hakim, N., Candra, J., Yahya, A. A., & Kahar, 2023). Data collection began with the pretest (O1), followed by the four-week training program, and concluded with the posttest (O2) using the same LSPT protocol. Attendance and training consistency were monitored during the intervention to support implementation quality (Kurniawan, R., Purnama, Y., Nanang, A., & Aminudin, 2024).

Data were analyzed by comparing pretest and posttest LSPT results for all participants. Normality was checked using the Shapiro–Wilk test. If data were normally distributed, a paired-samples t-test was used; if not, the Wilcoxon Signed-Rank Test served as an alternative (Syahputri, A. Z., Fallenia, F. D., & Syafitri, 2023). To complement statistical significance, Cohen's d was calculated to estimate the magnitude of the intervention effect. Results were planned to be presented in tables and simple visuals, using a significance threshold of $p < 0.05$

RESULTS AND DISCUSSION

Table 1. Descriptive Statistics (LSPT Scores)

Measurement	N	Mean	SD
Pre-test	20	64.10	5.04
Post-test	20	60.90	4.13

Table 2. Shapiro–Wilk Normality Test

Variable	W	p-value	Decision (α = 0.05)
Pre-test	0.972	0.798	Normal
Post-test	0.985	0.100	Normal

Table 3. Paired-Samples t-Test (Pre-test vs Post-test)

Pair	Mean Difference (Pre – Post)	SD Difference	SE	95% CI (Lower)	95% CI (Upper)	t	df	p	Decision
LSPT Pre vs Post	3.201	1.667	0.373	2.421	3.981	8.587	19	< 0.001	Significant

Table 4. Effect Size and Correlation

Statistic	Value	Interpretation
Cohen's d (dz)	≈ 1.92	Very large effect
Pre–Post Correlation (r)	0.953	Very strong
Correlation p-value	< 0.001	Significant

Table 3 presents the results of the paired-samples t-test comparing pre-test and post-test Loughborough Soccer Passing Test (LSPT) scores. The mean difference represents the average change in performance between measurements, calculated as pre-test minus post-test scores, where a positive value indicates improved passing performance due to lower post-test scores. The standard deviation of the difference reflects the variability of individual changes, while the standard error indicates the precision of the estimated mean difference. The 95% confidence interval shows the range within which the true mean difference is likely to fall. The t-value, degrees of freedom, and p-value are reported to determine whether the observed difference between pre-test and post-test scores is statistically significant.

Based on the statistical output you provided (normality test and paired t-test), the descriptive results show that the Loughborough Soccer Passing Test (LSPT) scores decreased after the intervention. The pre-test mean was 64.10 (SD = 5.04), while the post-test mean was 60.90 (SD = 4.13) with N = 20. Because in the LSPT a lower score indicates better performance (faster execution and/or fewer errors), this decrease suggests

an improvement in passing performance after the scanning-based diamond passing program. On average, the improvement was approximately 3.20 points, equivalent to about 4.99% compared to the pre-test mean.

The Shapiro–Wilk normality test indicated that both sets of scores were normally distributed (pre-test $W = 0.972$, $p = 0.798$; post-test $W = 0.985$, $p = 0.100$; $p > 0.05$). Therefore, a paired-samples t-test was appropriate.

The paired-samples t-test showed a statistically significant difference between pre-test and post-test scores. The mean difference was 3.201 (SD difference = 1.667; SE = 0.373) with a 95% confidence interval of [2.421, 3.981], and the result was $t(19) = 8.587$, $p < 0.001$. This confirms that the intervention had a significant effect on improving passing performance (reflected by lower LSPT scores). The practical magnitude of the effect was very large, with an estimated Cohen's d (dz) ≈ 1.92. In addition, the pre–post correlation was very high ($r = 0.953$, $p < 0.001$), indicating consistent individual ranking across measurements while still showing overall group improvement.

The findings indicate that integrating scanning into diamond passing training is effective for improving passing performance in U13 players. The lower post-test LSPT scores show that players got better at making passes when they were under pressure from time and targets (Ali, A., Williams, C., Hulse, M., Strudwick, A., Reddin, J., Howarth, L., Eldred, J., Hirst, M., & McGregor, 2007). This finding is consistent with the primary objective of scanning, which is to assist players in making quicker and more informed decisions by providing enhanced information about their environment (Jordet, G., Aksum, K. M., Pedersen, D. N., Walvekar, A., Trivedi, A., McCall, A., Ivarsson, A., & Priestley, 2020).

One of the best things about this intervention is that it teaches both perceptual-cognitive skills, like scanning and situational awareness, and technical skills, like passing mechanics and tempo, all in one drill (Aksum, K. M., Pokolm, M., Bjørndal, C. T., Rein, R., Memmert, D., & Jordet, 2021). The diamond passing format naturally speeds up the game, makes the ball move around more, and gives players more places to pass. When scanning instructions are deliberately embedded such as requiring players to look up and identify the next target or visual cue the drill encourages the development of essential skills in modern football, where both space and time are highly constrained (Hakim, N., Candra, J., Yahya, A. A., & Kahar, 2023). Some of these skills are moving your head, being aware of your surroundings, making decisions, and passing the ball quickly (Oppici, L., Panchuk, D., Serpiello, F. R., & Farrow, 2018).

Also, the statistically significant improvement, the large effect size, and the fact that the confidence interval is always positive all point to the fact that the changes were not likely to be random and instead show a real training effect. The strong pre–post correlation suggests that higher-performing players remained relatively better than others, but the entire group shifted toward improved passing outcomes (Oppici, L., Panchuk, D., Serpiello, F. R., & Farrow, 2018). Overall, these results support the idea that passing accuracy development in youth football is more effective when training goes beyond isolated technique and deliberately includes cognitive behaviors such as scanning in conditions that resemble real match dynamics (Williams, A. M., Thomas, J. L., Jordet, G., & Ford, 2023).

Previous research has emphasized the central role of visual exploratory behavior in football decision-making. (Jordet, G., Aksum, K. M., Pedersen, D. N., Walvekar, A., Trivedi, A., McCall, A., Ivarsson, A., & Priestley, 2020) explicitly stated that "players who scan more frequently before receiving the ball are more likely to execute successful passes under pressure". This statement directly supports the present findings, as the structured scanning cues embedded in the diamond passing drills likely enhanced players' ability to anticipate passing options and reduce decision-making time.

To further strengthen this argument, the current results suggest that training interventions targeting passing accuracy may be more effective when cognitive behaviors such as scanning are deliberately incorporated rather than trained separately. While traditional passing drills often emphasize repetition and mechanical execution, they may fail to adequately prepare players for the perceptual demands of real match situations (Roca, A., Ford, P. R., McRobert, A. P., & Williams, 2013). By integrating scanning instructions into a dynamic passing structure, the present study provides empirical support for a more holistic training approach that aligns technical skill development with perceptual–cognitive processes in youth football.

CONCLUSION

This study concludes that integrating scanning into a diamond passing training program effectively enhances improves passing performance

in U13 football players. The LSPT results showed a clear drop in scores from the pre-test to the post-test. This means that the passing execution was better (lower scores mean faster and more accurate performance). Statistical analysis confirmed this improvement: the data were normally distributed, and the paired-samples t-test demonstrated a effectively enhances difference between pre-test and post-test scores ($p < 0.001$) with a very large effect size. Therefore, the scanning-based diamond passing intervention can be considered an effective and practical training method to enhance passing accuracy in youth football by combining technical execution with perceptual–cognitive decision-making skills.

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