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The Effect of Fixed and Variable Practice Based on Distance and Target Size on Developing Shooting Skill Performance in Futsal Players

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ORIGINAL STUDY

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Abstract

The importance of the research lies in identifying exercises in the fixed and variable styles, using targets of different sizes and working at varying distances to improve players' skill performance. The research aimed to prepare exercises according to the distance and size of the targets and to identify the extent of the impact of these exercises on the scoring skill performance of futsal players by measuring the accuracy and speed of the skill. The researcher used the experimental method with a two-group design, selecting the research sample purposively from the College of Arts, University of Baghdad, futsal team. The sample consisted of 12 players, divided into two experimental groups using individual and paired division, with each group consisting of 6 players, based on pre-test results to achieve skill parity between groups. After conducting the experiment and the post-test, skill performance was measured using the modified Fitts' Law, also known as the law of skill performance for accuracy and speed. After statistically processing the data, the researcher found differences between the pre-test and post-test results in favour of the post-tests, as well as differences between the post-tests in favour of the variable training group.

Keywords: Static training, Variable training, Shooting skill performance, Futsal

1. The introduction

Futsal is a popular and widespread sport due to its display of beautiful and enjoyable technical and tactical performance, it can be performed in small playgrounds and is practiced in many places (Jameel, 2025, p. 559–568). "Because of its status with the fans, it was necessary to pay attention to its development and to search for the best ways to outperform the opposing teams" (Jameel, 2025, pp. 82–90). Likewise, training players in conditions similar to those of a match and with influences helps players to overcome difficulties on the field, especially in futsal (Lazem and Qasim, 2017, pp. 114–126).

The importance of this research lies in identifying the most effective modern methods to save time and effort in training shooting skills.

Based on the researcher's experience as a former coach and player in the sport, and through his field

presence, he observed that the problem lies in the underuse of diverse training methods. Furthermore, the lack of exposure to a wide range of variables, such as playing conditions, leads to boredom among players. Where the performance is at a constant pace, regardless of distance and the size of the training goals, and without changing the pattern used. Since skill performance is essential in the field of play and in outperforming competing teams, it was necessary to find ways and means to bring the athlete to reasonable levels of this performance (Jameel, 2017, pp. 9–20). The research aimed to identify the effects of fixed and variable training, according to target distance and size, on the development of shooting skill performance in futsal players. And to determine which of the two methods is better to use. The researcher assumed that there were statistically significant differences between the pre-tests and post-tests of the two experimental

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groups, as well as differences between the post-tests.

Previous Studies: (Abdul-Hussein, 2007) Study (The effect of using fixed and variable training in learning some basic open and closed skills in football). The study aimed to: identify the impact of fixed and variable training on learning specific open and closed skills, as well as the best method for each skill. The researcher used the experimental method, and the sample was deliberately selected from 24 first-year students in the Faculty of Physical Education. The sample was divided into four groups, each group containing 6 students. The groups work as follows: the first is a pass from a stationary position; the second, a pass from a moving position; the third, a shot from a stationary position; and the fourth, a shot from a moving position. The curriculum lasted 6 weeks, with two units per week, and the repetition volume was consistently maintained for all groups. After presenting the results, the researcher concluded that fixed training favoured passing skills, while variable training favoured shooting skills. As for the study (Jameel, 2012) (The effect of special exercises using devices and tools to develop the speed of motor response, handling accuracy, and scoring for futsal players). The study aimed to design tests and prepare exercises to develop motor responses, handling accuracy, and shooting skills among futsal players using devices and tools. The researcher used an experimental design with a control and an experimental group, and the sample was purposively selected, totaling 80 participants. Fifty elite league players were selected to design the tests, along with 10 exploratory players and 20 players representing the Iraqi national team. The sample was divided into a control group and an experimental group. After experimenting, the researcher concluded that the use of devices and tools during the exercises, along with the performance method, contributed to the development of response speed and aiming accuracy. The current study agreed with Mohammed's 2007 study, which stated that a fixed training method improves accuracy or consolidates basic skills. While the variable exposes the player to changing demands similar to playing conditions and decision-making in different and varied circumstances, this improves performance and shooting skills. However, the difference lies in the fact that the recent study used targets of varying sizes and training from different distances, in addition to using modern training and measurement devices. The point of agreement with Ismael's 2012 study was the use of advanced equipment in both studies. In addition to developing shooting skills in terms of accuracy and speed, the difference lies in the style, method, and the number and type of equipment used.

2. Research methodology

The researcher used the experimental method with a two-group design, as it was suitable for the nature of the research.

2.1. Method and procedures

The sample was purposively selected from 12 players on the College of Arts team, which won first place in the University of Baghdad championship, representing the field of human studies. As for the spatial area, it is the Faculty of Arts playground. The total time period was from March 10, 2025, to May 4, 2025. The sample was divided into two experimental groups after the pre-test, using the odd-pair distribution method, which is one of the best methods for achieving skill equivalence. In addition to adjusting the variables, each group consists of 6 players: the first group works on a fixed exercise, and the second on a variable one. The first group exercises with a fixed target and distance, while the second group works on targets of varying sizes and distances. The curriculum lasted 6 weeks, with two units per week, for a total of 12 units. The total repetition volume was equal for both groups. The repetition starts with 36 units and then increases as you progress through the units. The difficulty increases gradually as the number of repetitions increases, while maintaining a constant performance time, and then increases further as the performance speed increases. See Appendix (1), which shows the volume in terms of repetition, sets, and rest, as well as the times spent performing. The pilot study was conducted on a sample of 6 players from the Faculty of Pharmacy team on March 10, 2025. The location was the Faculty of Arts field itself, and the researcher used the SPSS statistical package to perform the appropriate analyses and obtain the results.

A test was designed to measure skill performance in terms of accuracy and speed, and to be consistent with the reality of the game, where accuracy is calculated at the target's angles and in accordance with the devices and tools used by the researcher.

Test: Skill performance in shot (speed and accuracy of shot)

**Objective:** To measure the skill performance in the shot.

Tools and equipment used: A target drawn on a 2x3m wall divided into sections, where the most significant number is in the corners of the target, and outside each corner is placed one of the four numbers for the purpose of determining it by the player when he hears it from the random audio device, a Random Shot device, a high-speed Nokia camera of 300 images

per second, an HP laptop computer, eight balls, adhesive tape, a whistle, and a leather measuring tape.

How to play: The player stands behind a line 12 meters from the target. As they begin rolling the ball between two cones of the Random Shot device and a light cone, the device emits a random 4-digit number, and simultaneously, a light illuminates. The purpose of the light is to measure the start of the timing process via the camera (since high-speed cameras do not record sound but only movement and light). The player must shoot before crossing the 10-meter line to the designated side, aiming for the farthest corner.

Note: After all players have finished the first attempt, the attempt to score is repeated before the 12m and 14m lines.

Scoring: A player is awarded 3 points for hitting the farthest corner of the target, 2 points for hitting the next square, and 1 point for hitting the centre of the target. Three attempts are given, and the average of the three attempts and the time is calculated using the Kinovia analytical software on a computer from the video recorded by the high-speed camera. Then, the skill performance formula is applied to calculate each player's accuracy and speed.
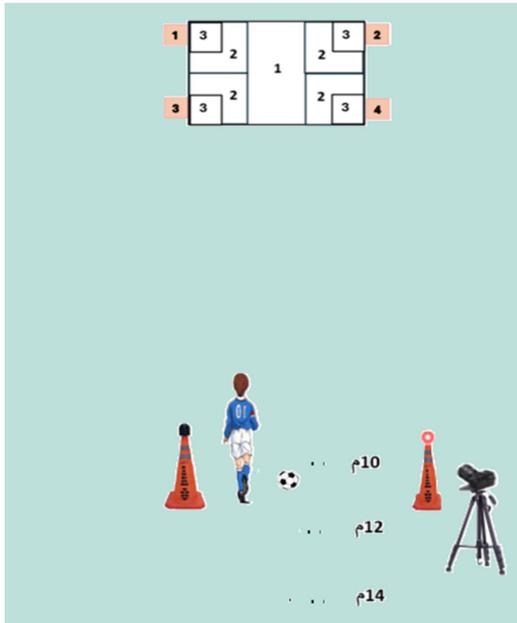
2.2. Scientific foundations

Validity: Self-validity was used through the root of reliability (0.958) = (0.978)

Reliability: The test was administered to a sample of 5 players from the College of Pharmacy team on March 11, 2025, and then repeated on March 16/2025. The simple correlation coefficient (Pearson) was used, and the calculated value was significant (p < 0.05).

Table 1. Shows the test's reliability using the Pearson correlation coefficient.

N	stability coefficient	sig
5	0.958*	0.01

Table 1 and the application of the test-retest method to a sample of 5 players showed that the reliability coefficient was 0.958, a high value. This indicates a substantial degree of internal consistency between the two measurements. The significance level reached sig=0.01, which is less than 0.05, indicating that the reliability coefficient is statistically significant and thus characterized by a high degree of reliability.

Objectivity: When a precise calculation is used, employing accurate methods and tools that eliminate any error margin, and when bias is avoided through high-speed camera calculations and sophisticated analytical software, then the test is considered objective beyond any doubt. A test is objective when it relies on conclusive evidence, leaves no room for doubt, and is free from subjective evaluation (Qasim, 2009, pp. 25–41).

After establishing the test's scientific validity, the pre-test was conducted on the research sample (the two experimental groups) on March 17, 2025.

Table 2 shows the extent of equivalence of the two experimental groups before the implementation of the experimental treatment, where the mean of the fixed exercise group was 1.1152 with a standard deviation of 0.0164, while the mean of the variable exercise group was 1.1202 with a standard deviation of 0.0159. The t-test was 0.535, and the p-value was 0.604, which is greater than 0.05, indicating that there is no statistically significant difference between the two groups.

The curriculum was then implemented with the two experimental groups, using both fixed and variable training, for six weeks, from March 18, 2025, to April 30, 2025, for a total of 12 units. The post-test was administered on May 4, 2025.

2.3. Presenting and discussing the results

Table 3 shows statistically significant differences between the pre-test and post-test scores of the two experimental groups, indicating improved performance after the exercises were implemented. We find a difference in the arithmetic means between the pre-test and post-test for the experimental group that used the fixed exercise, as well as for the group that used the variable exercise. There was an improvement in the post-test results for both groups compared to the pre-test. The researcher believes that regular exercises focus on mastering basic skills. Shooting from a fixed distance and with a fixed target size has helped players develop accuracy and proper technique by

Table 2. Shows the equivalence between the two experimental groups for the research variables.

Unit of measurement	fixed			Varied (variable)			t	sig
	mean	Std. deviation	N	mean	Std. deviation	N		
D/T	1.1152	0.0164	6	1.1202	0.0159	6	0.535	0.604

Table 3. Shows the arithmetic means, standard deviations, t-values, and their statistical significance for the pre-test and post-test results of the two experimental groups.

The group	36.1ptN	Pre-test		Post-test		t	sig
		mean	Std. deviation	mean	Std. deviation		
fixed	6	1.1152	0.0164	1.3432	0.0709	8.360	0.001
Varied (variable)	6	1.1202	0.0159	1.4442	0.0551	16.855	0.001

Table 4. Shows the arithmetic means, standard deviations, t-value, and their statistical significance for the post-test results of the two experimental groups.

Unit of measurement	fixed			Varied (variable)			t	sig
	mean	Std. deviation	N	mean	Std. deviation	N		
D/T	1.3432	0.0709	6	1.4442	0.0551	6	2.752	0.02

focusing on specific exercises. Likewise, consistent repetition and regular practice improved accuracy and ball feel.

The player improves through repetition or persistence across several attempts (Singer and Milne, 1975, p. 85). Furthermore, the results of the post-test variable exercise group were significantly more pronounced than those of the pre-test. The researcher believes that changing the size of the targets and the distances increases the challenge for the player and exposes him to conditions similar to those encountered in changing playing conditions, which positively affects the accuracy and speed of performance. Note that consistent training means successive repetitions of a single performance and a fixed execution, with a single variable.

Variable training, on the other hand, involves performing the skill in all its forms, which requires preparing to accept changing circumstances and acting accordingly (Khayoun, 2010, p. 109). Training also improves an athlete's ability to respond to events on the field of play, thereby enhancing performance (Bompa and Haff, 2009, p. 146).

The results in Table 4 show statistically significant differences between the two experimental groups, favouring the variable exercise group. There was a noticeable improvement in the variable exercise group, with a greater difference than in the fixed exercise group. The researcher believes that the playing conditions are closest to those of variable training, where decision-making ability improves. When faced with new challenges, the player learns to make quick, correct decisions and to shoot the ball under different conditions. In addition, there is an improvement in

temporal and spatial awareness during the skilful execution of scoring, enhancing the ability to determine the appropriate place to shoot the ball.

Furthermore, the variety of exercises improves the use of various techniques for skill performance, which is reflected in the diversity of performance on the field under different conditions. Furthermore, increasing the distance and reducing the size of the targets requires greater strength in performance and greater accuracy in aiming, thereby improving performance. Schmidt (1991) views variable practice as a successive series of practice exercises in which the learner is subjected to several variables simultaneously during a single practice. This necessitates diversifying skill combinations and models to learn performance in different environments and for other purposes, such as throwing a football from varying distances (Mahjoub, 2000, p. 202).

Furthermore, the more attempts and repetitions there are, the shorter the reaction time resulting from those attempts (Magill, 2011, pp. 177–178). Furthermore, consistent and varied training helps develop reaction time, thus preparing the player for this and providing an opportunity to refine their skills (Mulqueen et al., 2010, p. 8).

3. Conclusions and recommendations

3.1. Conclusions

The two experimental groups showed a remarkable improvement in shooting performance, as the arithmetic means of their post-tests were greater than those of their pre-tests, as shown in Table 3. This

indicates the effectiveness of exercises by distance and target size in improving shooting accuracy and motor performance.

The experimental group with the variable training showed greater development than the group with the fixed training, as evidenced by the results in Table 4. This indicates that changing the distances and sizes of the targets enhances the perceptual-motor abilities associated with aiming.

Variable training provides a more effective environment for match conditions, which helps to improve decision-making efficiency and direction accuracy.

3.2. Recommendations

Integrating static and variable drills into training sessions ensures both the improvement of fundamental technical skills and the development of adaptability to changing game conditions.

Varying the distances, target sizes, and shooting angles in training sessions enhances spatial awareness, accuracy, and the player's ability to handle real-world game situations.

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A. Appendix

A.1. Variable exercise set

Week	Training Unit	Goal dimensions		Distance to goal (m)		repetitions	Sets	Players' time per set	Daily repetition	Rest between sets	Total time
1	1	2×3m	fixed	8×10m	fixed	12	3	60 s	36	120 s	22 min
	2		fixed	10×12	variable	12	3	60 s	36	120 s	22 min
2	3		fixed	12×14	variable	13	3	65 s	39	140 s	24.16 min
	4		fixed	14×16	variable	13	3	65 s	39	140 s	24.16 min
3	5	2×2m	variable	8×10	fixed	14	3	70 s	42	160 s	26.33 min
	6		fixed	10×12	variable	14	3	70 s	42	160 s	26.33 min
4	7		fixed	12×14	variable	15	3	75 s	45	160 s	27.83 min
	8		fixed	14×16	variable	15	3	75 s	45	160 s	27.83 min
5	9	1×1m	variable	8×10	fixed	16	3	80 s	48	180 s	30 min
	10		fixed	10×12	variable	16	3	80 s	48	180 s	30 min
6	11		fixed	12×14	variable	16	3	80 s	48	180 s	30 min
	12		fixed	14×16	variable	16	3	80 s	48	180 s	30 min

A.2. Stationary fixed set

Week	Training Unit	Goal dimensions		Distance to goal (m)		The same repetitions, sets, rest periods, and time are used in the variable exercise.
All	All	2 × 3 m	All fixed	10 × 12 m	All fixed	

B. Random shot device: (Ismael 2012)

It is a training device used in a training system to enhance focus and reaction speed in various games and events, particularly football. In addition to the enjoyment of training, it can be used for all athletic levels. The device randomly displays a series of numbers using its motion sensor and automated speaker. Mention any four-digit number that is not sequential, given that the numbers are (1, 2, 3, 4).

There are four other numbers fixed on the four corners of the target. When the player passes in front of the device, it emits a sound with one of the numbers, and the player must respond and aim at the mentioned number. The device was imported and first used in 2011 by researchers.

تاثير التمرين الثابت والمتغير وفق المسافة وحجم الاهداف لتطوير الاداء المهاري للتهديف للاعبي كرة القدم للصالات

اسماعيل قاسم جميل

جامعة بغداد/ قسم النشاطات الطلابية

الملخص

تكمن اهمية البحث في ايجاد تمرينات بالاسلوب الثابت والمتغيرمن خلال استخدام اهداف باحجام مختلفة يتم العمل عليها وبمسافات متنوعة للارتقاء بالاداء المهاري للاعبين. وهدف البحث الى اعداد تمرينات وفق المسافة وحجم الاهداف والتعرف على مدى تاثير تلك التمرينات في الاداء المهاري للتهديف للاعبي كرة القدم للصالات . وقد استخدم الباحث المنهج التجريبي بتصميم المجموعتين التجريبيتين حيث تم اختيار عينة البحث بالطريقة العمدية لفريق كلية الاداب جامعة بغداد بكرة القدم للصالات . حيث كان عدد افراد العينة 12 لاعبا تم تقسيمهم الى مجموعتين تجريبيتين بطريقة التقسيم الفردي والزوجي لكل مجموعة ستة لاعبين من خلال نتائج الاختبار القبلي لتحقيق التكافؤ المهاري بينهما . وبعد اجراء التجربة توصل الباحث الى وجود فروق بين نتائج الاختبارات القبلية والبعدية لصالح الاختبارات البعدية فضلا عن وجود فروق بين الاختبارات البعدية لصالح مجموعة التدريب المتغير.

الكلمات المفتاحية: التمرين الثابت، التمرين المتغير، الاداء المهاري للتهديف، كرة القدم للصالات