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Original Article

A Set of Exercises for the Acquisition of the Technical Fundaments of Basketball in Eighth Graders

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ABSTRACT

Introduction: The technical fundamentals of basketball consist of the movements a basketball player acquires throughout training, which are basic because they constitute the pillar of the whole game. Following a strict project, there are four fundamentals: dribbling, passing, shooting, and defensive movements.

Aim: To determine the set of exercises to help acquire the technical fundamentals of basketball in eighth-graders.

Materials and Methods: This experimental study relied on a pre-experiment consisting of pre-test and post-test studies.

Results: The main empirical methods applied were survey and measurement, through the specific motor skills test. The efficacy of the exercises suggested was checked through the Shapiro Wild normality test, and the Wilcoxon range test.

Conclusions: As a result of the comparison of the three tests during the pre-test and post-test, the P-value < α=0.05 (asymptotic Sig. 0.01, 0.02, and 0.02), with significant differences between the number of errors made by the players after the application of the exercise system proposed.

Keywords: Exercises, basketball, technical fundamentals, teaching

INTRODUCTION

The term fundamentals refers to the set of technical skills acquired by individual players to practice a sport in particular. The basic elements of basketball are passing, dribbling, shooting, and defensive movements. The teamwork is built up on these technical aspects, from which the other actions needed to complete the game derive, such as rebounds, cutting through the hoop, different blocking types, etc. The above technical elements are relevant and must be taught carefully from an early stage in the next categories. They are the foundations on which good players are made. When these techniques are acquired, they are mastered and applied correctly in the game; then to learn the most complex technical fundamentals is easy, and more time can be used to acquire them.

Sports, especially basketball, are part of an educational environment that contributes to more comprehensive training. Basketball is a good integrating product during the cognitive, intellectual-theoretical, and practical processes in class. "This start-up process in sports must entail the early initiation of those with potentially positive conditions to achieve further learning into higher sports performance" (Águila, 2019). The opportunities given by the teacher or coach are recommendable, since they compel a full change, using creative activities during practice with a gaming standpoint. "The alternative model focuses on the learning of recognition and comprehension of the elements and attributes of the game". (González, 2017, p. 65).

The technical fundamentals are the main resources of the greatest players in the world, constituting a set of processes and biomechanical and anatomy-functional processes, which are part of sports movements to be performed through maximum efficiency when they are mastered, such as passing, dribbling, shooting, and displacing. It is stated as an ideal conception based on today's basketball knowledge, which is the aspiration of every athlete, including the adjustment of their biological and intellectual traits during their training.

A review of the literature revealed that several authors: Rosa, A. (2013). (Orozco & Vera, 2017). Almeida, (2021), (Cando, 2017). Mancha *et al.,* (2019). Pérez, (2020). *Weineck J. (2005).* Noted that in the implementation of the game's technical elements during the attack and defense stages, the fundamental principles of biomechanics for different types of movements included in the performance of a technical element must be abided by. Dribble is an extremely relevant element that begins with the advancement of the ball possessed through the progression in the game applied to dribble, alternating both hands in the attack and defense quickly.

In basketball initiation, the technical fundamentals refer to the set of skills a player must have to practice the sport correctly. These are the fundamental pillars on which teamwork will rely. Hence, the other actions needed to complete the game will derive from them. The individual fundamentals are the base of basketball players. The mastery of the technical fundamentals should be the goal, understanding a technique as the set of movements or actions that permit the implementation of a particular model, which is considered the base of the game.

Technical fundamentals of basketball. Types of techniques

Several papers published by national and international authors about basketball teaching and its technical fundamentals will be referenced. Among the national scholars, Torres (2018), conducted a study on the methodological strategies to develop the basics in U10-12 athletes from the Jardines del Basket Club, which revealed the absence of strategies to enhance the basics of basketball in the junior category.

Today, basketball is constantly evolving, with a better formation in the game that is systematically and methodologically trained. The objective is to improve teaching-learning, seeking new strategies that offer improved techniques as part of the technical fundamentals of the sport. One of the main characteristics of today's basketball is the work done on the players' motor functions, who then understand the basics, and master the system of movements on the court, based on repetitions derived from the game intensity.

Moreover, Almeida, J. (2021) suggested a basketball manual for students. The theoretical elements used to design the proposal were the attack fundamentals, defensive fundamentals, and basketball concepts.

Accordingly, this research aims to design a set of exercises to help acquire the technical fundamentals of basketball in eighth-graders.

MATERIALS AND METHODS

This experimental study relied on a pre-experiment. The empirical method used was measurement during the initial diagnostic (pre-test), then, after the application of the exercises suggested (post-test). The population of the study was small; the corresponding hygienic and sanitary conditions required were met, which allowed for 100% sampling of the population: twelve basketball players registered in the eighth-grade program of the Higher Basic Education (secondary), aged 12. Below are the characteristics and results of the application of the empirical instruments.

Technical basketball test for the 12-year-old categories to determine the mastery of technical elements acquired by the players.

Category 12 years old

Exercise**:** Ball rolling for 10 meters using the right and left hands.

Objective: To measure the skills and abilities using both hands, including movement coordination.

Description: A 10-meter line is drawn, and the player will roll the ball using the right hand, and return doing the same with the left hand, coordination and time are evaluated.

Exercise: The ball is on the palm of the hand, in shooting position, then the player moves to a 10 m distance dribbling the ball. When the teacher signals, the player starts, using the right hand, and returns using the left hand.

Objective: To measure coordination movement skills with the ball in possession during the exercise.

Description: The ball is placed on the floor, and the players pick it up and place it in the shooting position, on the palm of the hand. Then the player moves to the 10 m line, changes hand, and returns to the previous position. Coordination, hand technique during the displacement, and execution time are evaluated.

Exercise: Two-step hoop approach, placing rings on the floor.

Objective: To measure the leg coordination skills when approaching the hoop.

Description: Two rings are placed near the backboard, and the player coordinates the movements to approach the hoop on the right and left sides on the count 1-2 steps. Movement coordination and the step technique are evaluated during hoop-approaching maneuver.

Exercise: Skill circulating the ball around the head, waist, and legs, three times each part.

Objective: To measure the ball changing skills from one hand to the other.

Description: The players will circulate the ball around different parts of the body, three times each. To measure coordination and execution time.

Exercise: shooting: dribbling, stopping, and shooting from the site.

Objective: To measure shooting skills with both hands.

Description: The players will exercise displacement while dribbling, and past the three-point line, they will stop and shoot using both hands.

Exercise: Circuit: Displacement + stop + displacement + catch on the move + pass + catching + dribbling + layup.

Objective: to measure displacement skills, stop, turns, catch, pass, dribble, and hoop approach.

Description: The players stand under the hoop, and at the teacher's mark, they start running to the front, then at the basket, they stop for a jump, turn, and go on; they catch the ball, dribble, and end with a layup hoop approach.

Evaluation:

- 0 errors equals excellent.
- 1 error equals very good.
- 2 errors equal good.
- 3 errors equal average.
- 4 errors equal bad.

RESULTS AND DISCUSSION

Table 1 shows the results of the general evaluation of the technical fundamentals assessed as EXCELLENT, VERY GOOD, GOOD, AVERAGE, and BAD. The parameters show that over 70% were between average and bad concerning every technical aspect (Table 1).

Table 1 - Technical tests for eighth-graders aged 12

General evaluation of technical fundamentals

	Results of test assessment												
	Left-Right dribble.		**1-2 step hoop approach**		**Dribbling, stopping and shooting**			**Left-Right dribble**		**1-2 step hoop approach**		**Dribble, stopping, and shooting**	
No.	**Err.**	**Eval.**	**Err.**	**G**	**Err.**	**Eval.**	**No.**	**Err.**	**Eval.**	**Err.**	**Eval.**	**Err.**	**Eval.**
1	**3**	**A**	**4**	**B**	**2**	**G**	**1**	**0**	**E**	**0**	**E**	**0**	**E**
2	**3**	**A**	**3**	**A**	**4**	**B**	**2**	**0**	**E**	**0**	**E**	**0**	**E**
3	**5**	**B**	**2**	**G**	**5**	**B**	**3**	**1**	**VG**	**0**	**E**	**0**	**E**
4	**4**	**B**	**3**	**A**	**2**	**A**	**4**	**0**	**E**	**0**	**E**	**0**	**E**
5	**4**	**B**	**5**	**B**	**4**	**B**	**5**	**0**	**E**	**0**	**E**	**0**	**E**
6	**5**	**B**	**5**	**B**	**4**	**B**	**6**	**1**	**VG**	**0**	**E**	**0**	**E**
7	**5**	**B**	**5**	**B**	**4**	**B**	**7**	**1**	**VG**	**0**	**E**	**0**	**E**
8	**5**	**B**	**5**	**B**	**5**	**B**	**8**	**1**	**VG**	**0**	**E**	**0**	**E**
9	**4**	**B**	**5**	**B**	**4**	**B**	**9**	**0**	**E**	**0**	**E**	**0**	**E**
10	**4**	**B**	**3**	**A**	**3**	**A**	**10**	**0**	**E**	**1**	**VG**	**1**	**VG**
11	**4**	**B**	**4**	**B**	**4**	**B**	**11**	**0**	**E**	**1**	**VG**	**1**	**VG**
12	**4**	**B**	**5**	**B**	**5**	**B**	**12**	**1**	**VG**	**2**	**G**	**2**	**G**

Made by: Castro 2021.

Table 2. Technical test of basketball for the 12-year-old categories, to determine the mastery of technical elements acquired by the players.

The table shows the negative pre-test results, in which a high number of students were evaluated as Bad and Average. Then, upon application of the alternative proposal, the post-test revealed significant values, where the technical fundamentals were evaluated as excellent, very good, and good, demonstrating the pertinence of the alternative proposal (Table 2).

Table 2. Basketball technical test

		PRE-TEST								POST-TEST									
No.		**E**	**%**	**G**	**%**	**A**	**%**	**B**	**%**	**E**	**%**	**VG**	**%**	**G**	**%**	**A**	**%**	**B**	**%**
1	**Left-right dribble**	0	0	1	8	2	17	9	75	8	66.3	4	33.7		0	0	0	0	0
2	**1-2 step hoop apprch.**	0	0	1	8	3	25	8	67	9	75	2	8	1	0	0	0	0	0
3	**Dribble, stop and shoot**	0	0	1	8	2	17	9	75	9	75	2	17	1	0	0	0	0	0

Made by: Castro 2021.

The pre-test results show the existence of technical issues and shortcomings. The following results were confirmed: dribble with the left hand and right hand (75% bad); 1-2 step hoop approach (67% bad); dribbling, stopping, and shooting (75% bad), which evidences the low technical level of the players before the application of the set of exercises proposed. However, following the application of the exercises, the values were different: left and right-hand dribble (63.0 % excellent); 1-2 step hoop approach (75% excellent), and dribbling, stopping, and shooting test (75% excellent).

To confirm the results, the normality test was performed (Table 3) (Table 4).

Table 3. - Normality test

	Kolmogorov-Smirnov[a]			**Shapiro-Wilk**		
	Statistics	gl	Sig.	Statistics	gl	Sig.
PRE-TEST DRIBBLE ERRORS	.258	12	.026	.818	12	.015
PRE-TEST HOOP APPROACH ERRORS	.301	12	.004	.801	12	.010
PRE-TEST DRIBBLING, STOPPING, AND SHOOTING ERRORS	.314	12	.002	.829	12	.020

a. Lilliefors significance correction

Shapiro-Wilk normality test during the post-test.

- Ho: If P-value > α=0.05, there is normal data distribution.
- Hi: If P-value < α=0.05, there is no normal data distribution.

Table 4. - Normality tests

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistics	gl	Sig.	Statistics	gl	Sig.
POST-TEST DRIBBLE ERRORS	.417	12	.000	.608	12	.000
POST-TEST HOOP APPROACH ERRORS	.446	12	.000	.592	12	.000
POST-TEST DRIBBLING, STOPPING, AND SHOOTING	.446	12	.000	.592	12	.000

a. Lilliefors significance correction

The results of the Shapiro Wilk normality test demonstrated that the sample data of the initial test (pre-test), had a normal distribution since P-value (Sig.) > α=0.05. However, the post-test P-value (Sig.) < α=0.05, underwent no normal distribution in this case. Consequently, the alternative hypothesis stating that there is no normal data distribution can be accepted.

The Wilcoxon rank-sum test provided the following results in the samples related (Table 5).

Table 5. Test statistics

	Post-test dribble errors - Pre-test dribble errors	Post-test hoop approach errors - Pre-test hoop approach errors	Post-test dribbling, stopping, and shooting errors - Pre-test dribbling, stopping, and shooting errors
Z	-3.276[b]	-3.097[b]	-3.090[b]
Asymptotic significance (two-sided)	.001	.002	.002

a. Wilcoxon rank-sum test

b. Based on positive ranks

The results confirm the rejection of the null hypothesis, and embrace the alternative hypothesis, since the comparison of the three tests during the pre-test and post-test, the P-value < α=0.05 (asymptotic Sig. 0.01, 0.02, and 0.02), with significant differences between the number of errors made by the players during the pre-test, and after the application of the exercise system proposed during the post-test.

DISCUSSION

The opinions stated by several authors, such as Pehar M, (2017), Suni (J, 2018); (Almeida, 2014), (Pérez, 2020, p. 56). Weineck J. (2005), Sabando, M. V. (2017)

permitted defining the relevance of the technical fundamentals of basketball to provide early sports education to young players. It stresses the significance of sports and the human development of players, with special emphasis on coaches throughout the process, basketball practice, from mini-basket to the junior category. It can improve the health of younger players, and develop personal and social values, such as commitment, perseverance, responsibility, teamwork, and respect for rules and others. Moreover, it helps develop psychological resources such as self-confidence, self-concept, self-esteem, and self-control; it offers the young positive experiences like having fun, feeling competent, and receiving recognition and appreciation, as well as developing basketball skills in the players. To achieve the previous objectives, coaches must take advantage of the opportunities offered in the training sessions and games.

When the opinions of different authors are evaluated in this context, Bressel E (2007), Pizzigalli L, (2016), Pehar M. (2018). Brazzit A, (2013), Caamaño-Navarrete F, (2021), noted that the technical fundamentals are significant in the teaching-learning process (general and specific). The general opinions belong to the species and are dominated gradually by individuals, as they mature and develop; the specific ones are part of certain human activities and configure a structure of gestures or particular forms of moving and being part of the activity.

The normality test results enable the application of the Wilcoxon rank-sum test to the samples related, for which the following hypotheses were assumed:

Ho: If P-value > α=0.05, there are no significant differences between the pre-test data compared to the post-test data.

H1: If P-value < α=0.05, there are significant differences between the pre-test data compared to the post-test data.

The results of the experimental process allowed the researchers to introduce the pre-test and post-test data to the Shapiro-Wilk normality test during the pre-test and post-test, to perform the corresponding hypothesis test, as follows, to assess data normality during the pre-test:

- Ho: If P-value > α=0.05, there is normal data distribution.
- Hi: If P-value < α=0.05, there is no normal data distribution.

All the results showed the pertinence of the alternative: A set of exercises to help acquire the technical fundamentals of basketball.

The planning of the set of exercises to help acquire the technical fundamentals of basketball in eighth-graders consists of task-centered teaching-learning, a shared process of agreements among the participants whose main objective is to design a final product. In this case, the final product was the accomplishment of classwork detailed below: At the beginning of the term, 1) the students made pairs, which

were able to understand and break down all the fundamentals of basketball. The contents, that is, the individual technical fundamentals of basketball were handed to every pair randomly (Table 6).

Table 6. Alternative proposal A set of exercises to acquire the technical fundamentals of basketball in eighth graders

Technical objectives: To demonstrate the development of basic and specific techniques, knowledge, skills, and capacities to perform displacements, ball domain, passing, catching, and shooting individually, by pairs, and in groups.						
Duration: **7 weeks**		**Days**: **3 times a week, Mondays, Thursdays, and Fridays**				
First week:	Second week	Third week	Fourth week	Fifth week	Sixth week	Seventh week
Initial part	Initial part	Initial part	Initial part	Initial part	Initial part	Initial part
Information of objectives	Information of objectives	Information of objectives	Information of objectives	Information of objectives	Information of objectives	Information of objectives
Warm-ups General and specific	Warm-ups General and specific	Warm-ups General and specific	Warm-ups General and specific	Warm-ups General and specific	Warm-ups General and specific	Warm-ups General and specific
Main part	Main part	Main part	Main part	Main part	Main part	Main part (games)
Dsplcemnt. techniques **Posture** **Forward running** **Backward lateral** **Feints** **Direction changes** **Speed changes** **Stops:** **Steps Jumps** **Turns** **Forward, backward** **Defense** **Low position** **Combined actions of displacement**	**Dsplcemnt. technique** Forward running Backward lateral **Feints** Direction changes Speed changes **Combined actions of** Runs and stops Stops and turns **Ball handling** Classic grip Triple threat,	**Techniques Feints** Direction changes Speed changes **Feints** Direction changes **Ball handling** Classic grip Triple threat, passing, shooting, or dribbling **Dribble** With or without visual contact **Catching**	**Techniques Combined actions of** Runs and stops Stops and turns **Shooting** Free shooting Shooting on the move a) Under the hoop, (right-left) Catching Catching, stop Catching, steps, and fall Triple threat	**Techniques Catching** Shooting and passing on the move Catching and dribbling Catching y shooting on the move **Dribble** Dribbling with direction changes Dribbling with rhythm changes Dribbling, stopping, and shooting **Passing** Passing after	**Techniques Dribble** Dribbling with direction changes Dribbling with rhythm changes Passing after dribbling Dribbling and stops Dribbling and passing on the move **Shooting** Shooting on the move after dribbling Shooting on	3x3, 4x4 and 5x5 games Final part Back to rest Lesson analysis

and arm work **Pre-Sports game** **Final part** **Back to rest** **Training analysis** **Lesson conclusions**	passing, shooting, or dribbling **Catching** Above the waist **Ball seizing** Seizing and taking off the ball **Pre-Sports game** **Final part** Back to rest Training analysis **Lesson conclusions**	Above the waist Below the waist **Passes and variants** Using the two hands **1x1 defense** **Pre-Sports game** **Final part** Back to rest Training analysis **Lesson conclusions**	Catching, step Falling and dribbling **Passes and variants** Using the two hands **1x1 defense** **Pre-Sports game** **Final part** Back to rest Training analysis **Lesson conclusions**	dribbling and stops Dribbling, passing and moving **1x1 defense** **Pre-Sports game** **Final part** Back to rest Training analysis **Lesson conclusions**	the move after passing **1x1 defense** **Pre-Sports game** **Final part** Back to rest Training analysis **Lesson conclusions**	Lesson conclusions

CONCLUSIONS

More than 70% of the students evaluated in the pre-test related to the acquisition of technical fundamentals were between the Bad and Average categories. The application of the alternative proposal demonstrated the pertinence of the set of exercises suggested, which showed 80% evaluated as Excellent and Very Good. Furthermore, the results discarded of the null hypothesis, embracing the alternative hypothesis, since upon the comparison of the three tests during the pre-test and post-test the P-value < α=0.05 (asymptotic Sig. 0.01, 0.02, and 0.02), with significant differences between the number of errors made by the players during the pre-test, and after the application of the exercise system proposed during the post-test.

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