Implementation of Physical Fitness Test Measurement in Basketball Using an Application

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Abstract

This study focuses on the application of a fitness testing app to assess physical performance in junior high school students, specifically those involved in extracurricular basketball activities at Palembang 03 Public Junior High School. The primary objective is to establish norms for categorizing physical test results using the app, covering components such as speed, agility, strength, endurance, and muscle explosiveness. Employing a quantitative descriptive approach with survey research methods, the study involves 20 participants, comprising 10 male and 10 female students. Various physical tests, including a 30-meter run for speed, Bleep tests for agility, Push-Ups for strength, Bleep tests for endurance, and a vertical jump for muscle explosive power, were conducted as part of the data collection process. The research took place at Palembang 03 Public Junior High School in collaboration with the MGMP Pjok at the school. Analysis of the physical test results revealed that 9% of the participants achieved a "very good" category, 7% fell into the "good" category, 38% were classified as "average," 27% were categorized as "below average," and 19% were in the "poor" category. In conclusion, the predominant category was "average," constituting 38% of the participants. This study aims to heighten students' awareness of their physical conditions, fostering motivation for continuous improvement and emphasizing the significance of physical tests as tools for gauging fitness levels.

How to Cite

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INTRODUCTION

The Sport is an activity aimed at training both the spiritual and physical aspects of an individual. The term "olahraga" is derived from two words, "olah," meaning to cultivate, improve, and perfect, and "raga," referring to the body or physicality. Therefore, "olahraga" means cultivating or perfecting the physical body. According to Sukirno (2019:15) in (Ahmad Richard Victorian, 2021), achieving a healthy life can be accomplished by regularly engaging in sports. Sport has become a familiar part of everyone's daily activities and can be adopted as a lifestyle for individuals to enrich and enhance their basic and skilled movement abilities.

The purpose of engaging in sports is to enrich and enhance the ability to perform basic and skilled movements. This aligns with efforts to enhance the role of sports in national development, as outlined in the Republic of Indonesia Law No. 3 of 2005on the National Sports System Chapter II Article 4. This law emphasizes the goals of maintaining and improving health and fitness, achieving excellence, enhancing human quality, instilling moral values, sportsmanship, discipline, strengthening national unity, fostering national resilience, and uplifting the nation's dignity and honor (Afdinda et al., 2021) in (Siregar et al., 2022).

One of the most popular sports activities among students, both adolescents and adults, is basketball. In other words, basketball is a comprehensive sport that anyone can play regardless of their social background, gender, age, or culture. This is one aspect that makes basketball one of the most popular sports in the world. Basketball is a game played by two teams, each consisting of five players. The objective of the game is to score points by putting the ball into the opponent's basket using various techniques. Basketball is not only played for fun but also for achieving championship excellence.

According to Ahmad Richard Victorian (2019). , basketball is a sport that uses a large ball and involves playing using hands. The ball is passed to other individuals, bounced on the floor, either in place or while moving, with the aim of scoring points or putting the ball into the opponent's basket. In playing basketball, players need to have good physical condition to enhance the quality of their techniques. If a player has good techniques but poor physical condition, it can affect their playing style. Fitness is a crucial factor in achieving success. A good sport is one that is done regularly, paying attention to the body's capabilities

in harmony with the volume of sports activities. Students often engage in excessive physical training to prepare themselves for upcoming matches or championships within a short time frame (Bafirman in Kresnapati et al., 2020).

In playing basketball, besides technique, a good physical condition is necessary. If the physical condition is good, then the technique will also be good. On the contrary, if the physical condition is not good, it can lead to suboptimal performance in the game. A basketball player, during a match, must be in good physical condition. Ideally, good physical condition results in improved blood circulation and heart function. The escalation of strength, flexibility, speed, endurance, and other fitness components enhances the efficiency and effectiveness of movements in the right direction. A faster recovery time and quicker motoric reactions are achieved with good physical condition, which is essential for various components in the body and across different sports branches during training. Physical condition, according to Irwandi in (Ilham et al., 2019), refers to "one's ability to strive and work." It is also referred to as performance (kinerja). A person's physical condition consists of strength, speed, endurance, flexibility, and coordination.

Basketball is a sport that demands a very high level of physical fitness. Students must be in good physical condition to perform well and win matches effectively, given the small court size and the need for quick movements and maintaining control over the court for an extended period. Specific physical requirements, such as agility, explosive power in leg muscles, endurance, speed, and more, are necessary for basketball (Rustiawan et al., 2021). To assess whether a student's physical condition is good or not, measurements of physical condition are needed to identify any deficiencies so that the student's physical condition can be trained to improve.

Testing and measurements in the sports world are methods used to manage the data obtained. Testing and measurements are integral aspects of many human endeavors, including athlete instruction and training. Tests are tools used to obtain information or data about the subject being examined, while measurements are procedures to gather information. By doing these two things, you can determine the strengths and weaknesses of students and ultimately make the best decisions. The information obtained by coaches, as mentioned by Endriani, Akhmad, et al. in (Supriadi et al., 2023), facilitates the evaluation of students' progress in future training sessions. The recruitment or selection process invariab-

ly involves various measurements and tests. To assess the goodness of a student's physical condition, the use of appropriate tools is necessary. However, many teachers or coaches still use manual methods to measure students' physical conditions, leading to time-consuming and challenging measurements, especially when dealing with multiple students. This presents a challenge for teachers to leverage available technology to simplify and facilitate the measurement of students' physical conditions. In conclusion, testing and measurement are tools that serve to assist teachers in evaluating students.

The advancement of technology has been rapid, validated by numerous studies utilizing technology to facilitate human activities, including the field of sports. This impact is particularly notable in the realm of physical condition measurement. In a general sense, technology represents a stage that can escalate the added value of produced and used products, aiming to enhance and simplify the performance of structures. Technology encompasses various systems created by humans, with specific purposes to facilitate and enhance human activities, improving results, streamlining efforts, and conserving available resources and energy.

The utilization of technology is crucial in the field of sports education, especially in measuring students' physical conditions. Technology aids in managing existing data more effectively and efficiently than manual measurements. Complex applications are developed using various programming languages and technical infrastructure such as servers, networks, and operating systems. For instance, mobile applications are developed using programming technologies like Java or Swift, interacting with other technologies like GPS, cameras, or sensors in smartphones. Applications are programs designed to perform specific tasks or functions beneficial for users, installable and executable on various devices, including PCs, smartphones, tablets, or other devices.

According to (Dewi et al., 2021), an application is a program on a smartphone or computer used to operate a created program. An application can also be translated as a computer program created to assist humans in performing specific tasks. The application is designed using technology, creating a symbiotic relationship where applications and technology often work together and are a unified entity in many contexts. Applications refer to software or computer programs designed to perform specific functions or tasks, while technology is the tool, system, or process

used to create, support, or run these applications. In managing data, technology applied in applications is superior because it is more accurate than manual methods. In its management, application technology can reduce human errors and process data faster, especially when dealing with multiple students, providing quicker and more accurate results.

Based on observations at Palembang 03 Public Junior High School, the problem addressed in this research is that students participating in basketball extracurricular activities receive insufficient attention to their physical aspects. The focus is mainly on techniques such as shooting, passing, and dribbling. Without specific attention to physical condition, students may not be aware of whether their physical condition is good or suboptimal. Therefore, the researcher aims to conduct a study on students participating in basketball extracurricular activities at Palembang 03 Public Junior High School to measure physical test results using an application and describe the physical conditions of the students in relation to the norms provided by the application.

Given the above problems, the reason the researcher chose the title "Implementation of physical test measurement in the basketball branch using an application for students at Palembang 03 Public Junior High School " is to implement a new breakthrough or update regarding the measurement tool for physical test results. The problem arose from the fact that students at Palembang 03 Public Junior High School lacked specific attention to their physical conditions. Hence, this research aims to conduct physical tests on students participating in basketball extracurricular activities at Palembang 03 Public Junior High School, obtaining students from MGMP Pjok at Palembang 03 Public Junior High School. The resulting physical test results are then inputted into an application created by Prof. Dr. Dra. Hj. Hartati, M.Kes. The application displays the physical test results in accordance with the norms provided. The data obtained using the application is then described, revealing the positive or negative outcomes of the physical tests conducted on students in the basketball extracurricular activities at Palembang 03 Public Junior High School.

Relevant research conducted by (Hartati., 2019) titled "Training the Use of Physical Test Application for School Football Coaches Under KONI Ogan Ilir Supervision" has concluded that the training on the application of physical tests for football players is highly suitable for implementation. Coaches have access to the applicati-

on, and they are eager to inform their colleagues about the physical test version. This can help advance the coaching profession and provide promotion. The following are training recommendations for the use of technology-based activities based on the conclusions mentioned above. 1) If more than 90% of coaches or participants have an understanding of training activities involving the use of physical test applications, 2) more than 75% can practice its use, and 3) more than 50% of coaches are willing to socialize the ability to use physical test applications, then this training is successful. An assessment, namely the capacity of SSB coaches to understand the use of physical test applications, is derived from success indicators. Coaches face challenges with the application, although they are proficient in using it. Eighty percent of coaches are willing to introduce their colleagues to football physical test applications, and eighty percent of coaches can practice using them.

Based on the results of the previous research, the researcher is interested in conducting a study titled "Implementation of Physical Test Measurement in the Basketball Sports Branch Using an Application for Students at Palembang 03 Public Junior High School." This research aims to apply physical test measurements, especially in the basketball sports branch, using an application for students at Palembang 03 Public Junior High School under the supervision of MGMP Pjok at Palembang 03 Public Junior High School, to provide new insights into more modern physical test measurements. The advantage of this application is its ability to facilitate the measurement of basketball physical tests due to the inclusion of norms and the use of the Indonesian language, making it user-friendly. The application also has physical test norms that align with the students' physical conditions in the basketball sports branch. Moreover, the novelty of this application lies in its versatility, as it can be used for all sports branches, each with its unique physical conditions. It is not limited to only one sports branch, and it is hoped that this application will enhance understanding of physical test measurements and modernize sports equipment, especially basketball physical test measurement tools, with technology.

METHODS

The research conducted in this study is of the descriptive quantitative type using a survey method. Descriptive quantitative research aims to describe, examine, and explain a studied pheno-

menon as it is, drawing conclusions from observable phenomena using numerical data. This type of research focuses on portraying the contents of a variable without intending to test specific hypotheses. Therefore, descriptive quantitative research aims to depict, examine, and explain a phenomenon using data (numbers) as they are, without intending to test a particular hypothesis. The method employed in this research is a survey. According to Soheh et al., (2022), the survey method is commonly used with a large number of subjects and is intended to collect opinions or information about the status of phenomena during the research period. The subjects of this study are groups or individuals who are the focus or objects of the research. The subjects in this research are students (10 females and 10 males) participating in the basketball extracurricular activity at Palembang 03 Public Junior High School, selected from MGMP PJOK Palembang 03 Public Junior High School.

Data Collection Techniques

Data refers to units of information recorded in a medium that can be distinguished from other data, analyzed, and is relevant to specific programs. Data collection is a systematic and standardized procedure to obtain the necessary information. In this study, the researcher uses the method of collecting data. According to Arikunto (2013: 203), researchers typically use methods as a way to collect data in their research. As mentioned in (Maulidta & Sukartiningsih, 2018), the method used must be appropriate and suitable for the type of data to be collected. In this research, the data collection method employed by the researcher involves direct observation and interviews, requiring test instruments. This is crucial to obtain physical test results, which are then input into the application, revealing both good and poor norms. The tests conducted include speed tests using a 30-meter sprint, agility tests using the T-test, strength tests using Push Up, endurance tests using the bleep test, and muscle explosive power tests using the vertical jump.

Data Collection Instruments

Research instruments are systematically used tools to collect research data (Ismunarti et al., 2020). Therefore, the research instruments utilized in this study involve physical tests for each component of basketball physical fitness, measuring strength using Push Up, speed using a 30-meter sprint, agility using the T-test, endurance using the bleep test, and muscle explosive power using the vertical jump. The results are input

into the application and applied to MGMP Pjok Kota Palembang. A comparison is made between manual measurements and measurements using the application. The sequence of instruments used by the researcher is explained as follows.

30-Meter Sprint (Speed)
The procedure for conducting the 30-meter sprint speed test is as follows:
1. Athletes are ready to stand behind the starting line.
2. With the command "ready," athletes are prepared to run from a standing start.
3. With the command "go," athletes run as fast as possible, covering a distance of 30 meters until crossing the finish line.
4. Running speed is calculated from the moment of the "go" command.
5. Time recording is done up to a tenth of a second (0.1 seconds).
6. If possible, record up to a hundredth of a second (0.01 seconds).
7. The test is conducted twice. A runner performs the next test after at least one other runner.
8. Athletes are deemed unsuccessful if they cross or stray from the designated lane.

Table 1. 30 Meter Sprint Test Norms

Norms	Man	Woman
Excellent	3.58-3.91	4.06-4.50
Good	3.92-4.34	4.51-4.96
Adquate	4.35-4.72	4.97-5.40
Inadequate	4.73-5.11	5.41-5.86
Very Poor	5.12-5.50	5.86-6.30

(Source: Wiriawan, 2017)

T Test (Agility)
T Test Implementation Procedure:
1. Set up cones in a T-shaped position, with a distance of 5 yards (4.57 m) or 10 yards (9.14 m).
2. To start the test, the subject is positioned at Cone A.
3. Pay attention to the start command.
4. When the test begins, start the timer simultaneously.
5. The subject sprints to Cone B and touches it with the right hand.
6. Then, turn left with a sideward movement and touch Cone C with the left hand.
7. Continue moving sideways towards Cone D and touch it using the right hand.
8. Move towards Cone B and touch it with the left hand.
9. Afterward, run backward towards Cone A.

Table 2. Standing Stork Test

Norms	Man	Woman
Excellent	< 9,5	< 10,5
Good	9,5 - 10,5	10,5 – 11,5
Adquate	10,5 – 11,5	11,5 – 12,5
Inadequate	>11,5	>12,5

(Source: ((Wiriawan, 2017)

Push-Up Test
Objective: To measure upper body strength and endurance.
Equipment: Flat floor (mat), stopwatch, and writing utensil.
Implementation Procedure:
Starting Position:
1) The tester stands facing the participant, allowing one of them to be the movement counter.
2) The participant lies prone, placing the palms on the floor beneath the chest.
3) Both hands of the participant are positioned on the floor beneath their shoulders.
4) Elbows are maintained or locked in a straightened arm position.
5) The entire body remains straight, with no part of the body touching the floor except for both hands and heels. Both feet are stretched shoulder-width apart.
Execution:
1) The participant bends their arms, lowering the body until the chest can touch the counter's hand, then pushes back to the starting position.
2) The body must be kept straight throughout the movement.
3) The participant performs as many repetitions as possible without stopping.
Assessment: The score is based on the number of correctly executed repetitions within 60 seconds.

Table 3. Push Up Test Norms

Norms	Man	Woman
Excellent	56 ≥	35 ≥
Good	55 - 36	34– 22
Adquate	35 - 19	21 - 11
Inadequate	18 - 12	10 – 6
Very Poor	11 ≤	5 ≤

(Source: (Wiriawan, 2017)

Bleep Test
Objective: To measure the endurance of athletes.
Equipment: Flat track, measuring tape, cassette and tape recorder, cones, stopwatch; Personnel: Distance measurer, Start official, Track

supervisor, Score recorder.

Execution:

a. The bleep test involves running back and forth over a distance of 20 meters.

b. It begins with a gradual increase in running speed, starting slowly and progressively acce-lerating until the athlete is unable to maintain the pace in sync with the time rhythm.

c. The maximum endurance level is determined based on the back-and-forth running at which point the athlete can no longer keep up.

Assessment: Record the distance covered by the student in the back-and-forth run.

This endurance test, utilizing the Bleep/Multi-Stage method, is designed to gauge an athlete's ability to sustain effort over time. It involves progressively challenging running speeds to determine the point at which the athlete's endurance reaches its maximum level. The recorded distance covered during the back-and-forth run serves as an indicator of the athlete's endurance performance. (Source: Harsuki, 2017)

Table 4. Bleep Test Norms

Cat-egory (Man)	Age (Year)					
	10 -14	15-19	20-29	30-39	40-49	50-59
Excel-lent	≥ 52	≥ 48	≥ 43	≥ 36	≥ 31	≥ 26
Good	46-51	42-47	37-42	31-35	26-30	22-25
Adquate	41-45	38-41	33-36	27-30	22-25	18-21
Inad-equate	35-40	33-47	29-32	22-26	17-21	13-17
Very Poor	≤ 36	≤ 32	≤ 28	≤25	≤ 16	≤ 12
Cat-egory (Wom-an)	Age (Year)					
	10 -14	15-19	20-29	30-39	40-49	50-59
Excel-lent	≥ 48	≥ 42	≥ 36	≥ 29	≥ 25	≥ 19
Good	42-47	36-41	31-35	24-28	20-24	12-18
Adquate	36-41	31-35	25-30	20-23	15-19	5-11
Inad-equate	33-35	27-30	21-24	15-19	7-14	3-4
Very Poor	≤ 32	≤ 26	≤ 20	≤ 14	≤ 6	≤ 2

(Source: Harsuki, 2017)

Vertical Jump

Objective:To measure explosive power.

Equipment:

1. Dark-colored measuring board with a scale in centimeters, sized 30 x 150 cm, mounted on a flat wall or pole. The distance between the floor and zero on the test board is 150 cm.

2. Chalk powder.

3. Board eraser.

4. Writing tool.

Implementation Procedure:

1. Begin by applying chalk powder/magnesium carbonate to the participant's fingertips.

2. The participant stands upright near the wall, feet together, and the measuring board is on the right/left side of the participant's body. Lift the hand and press it against the scale board, leaving a fingerprint.

3. The participant takes an initial position by swinging the arms backward.

4. Then, the participant jumps as high as possible while tapping the board with the nearest hand to create an imprint.

5. Repeat this test for 3 opportunities without rest or alternating with other participants.

Assessment:

1. The difference between the jump height and the standing reach is calculated.

2. Record the differences from all three test attempts.

3. Input the result with the largest difference.

Table 5. Vertical Jump Test Norms (cm)

Norms	Man	Woman
Perfect	>70	>48
Excellent	62-69	44-47
Good	53-61	38-43
Adquate	46-52	33-37
Inadequate	38-45	29-32

(Source: (Pasaribu, 2020b)

The data analysis technique is a method used to manage data to generate accurate conclusions. In this study, a quantitative descriptive data analysis technique was employed. The data obtained from each measurement represent raw data from the results obtained by the students. Normality tests were conducted using computer software, specifically SPSS 29, and percentages were obtained using the following formula.

$$P = N/F \times 100\%$$

Source: (Sudijono, 2015)

Information:

P: persentase

F: frequency

N: number of cases

100% : Fixed numbers.

RESULTS AND DISCUSSION

Shapiro-Wilk Normality Test Results

The normality of the data was assessed using the Shapiro-Wilk test to determine whether the data follows a normal distribution. The normality test employed the Shapiro-Wilk analysis technique, and the calculations were conducted using SPSS. The tested data included the 30-meter sprint, T Test, Push-Up, Bleep Test, and Vertical Jump. For a detailed overview of the normality test results for the conducted physical tests, please refer to the table below

Table 6. Shapiro-Wilk Data Normality Test Results

	Test of Normality		
	Shapiro-Wilk		
	Statistic	df	Sig.
Endurance	.972	20	.789
Speed	.980	20	.937
Agility	.938	20	.224
Strength	.974	20	.843
Explosive Power	.958	20	.502
Balance	.959	20	.531

Analysis of Shapiro-Wilk Normality Test Table 6. The normality test was conducted using statistical tools in SPSS, and the results are presented in the Shapiro-Wilk table above. The data set (N=20) consists of 20 participants. To determine whether to accept or reject the null hypothesis, the significance level is examined. In the Shapiro-Wilk output table, the results for speed are 0.7, agility 0.9, strength 0.2, endurance 0.8, and muscle explosive power 0.5. All five significance values are greater than 0.05, indicating that the data is normally distributed. For a clearer understanding, the details are explained below.

1. Endurance Test Normality Test with a significance value (sig) of 0.1 resulted in sig = 0.789.
2. Speed Test Normality Test with a significance value (sig) of 0.1 yielded sig = 0.937.
3. Agility Test Normality Test with a significance value (sig) of 0.1 showed sig = 0.224.
4. Strength Test Normality Test with a significance value (sig) of 0.7 resulted in sig = 0.843.
5. Explosive Power Test Normality Test with a significance value (sig) of 0.5 yielded sig = 0.502.

Data Analysis Results

Based on the analysis of the data using quantitative descriptive formulas, the overall average of male and female students who underwent physical tests with results according to the norms in the application is as follows.

Table 7. Data Analysis Results

Indicator	Category				
	Excellent	Good	Adequate	Inadequate	Very Poor
Endurance	0%	20%	45%	15%	20%
Speed	0%	0%	35%	65%	0%
Agility	0%	0%	70%	20%	10%
Strength	0%	0%	10%	25%	65%
Explosive Power	45%	15%	30%	10%	0%
Average	9%	7%	38%	27%	19%
Average	10,8%	21,6%	41,6%	12,5%	13,3%

From the **Table 7** overall data on the results of physical tests using application norms can be obtained. The results of the tests, both for boys and girls, are described with the following average categories:

The "excellent" category for speed, agility, strength, endurance, and muscle explosive power is 9%.

The "good" category for speed, agility, strength, endurance, and muscle explosive power is 7%.

The "moderate" category for speed, agility, strength, endurance, and muscle explosive power is 38%.

The "poor" category for speed, agility, strength, endurance, and muscle explosive power is 27%.

The "very poor" category for speed, agility, strength, endurance, and muscle explosive power is 19%.

In conclusion, the highest average is obtained by male and female students from Palembang 03 Public Junior High School who participate in basketball extracurricular activities, falling into the "moderate" category with a percentage of 38%. "..." .... "with mention of source citations. If the quoted sentence in addition to the language of Indonesia should be in italic-type

The discussion will focus on the findings of the research regarding the implementation of physical test measurements in the sport of basket-

ball using an application on students from Palembang 03 Public Junior High School. The discussion will cover the results of speed, agility, strength, endurance, and muscle explosive power tests. According to (Raudatussolihah, 2022), Technology is the branch of knowledge that deals with skills acquired through experience, study, or observation. An Application, as described by (Parina et al., 2022), refers to a ready-to-use program that can be employed to execute commands from the user of that application, aiming to achieve more accurate results in accordance with the purpose of creating the application. The speed measurement was conducted using a 30-meter sprint test, referencing the theory of Wiriawan, (2017) and applying norms from the application created by Prof. Dr. Dra. Hj. Hartati, M.Kes. The results indicated that both male and female students fell into the "moderate" category (45%). Lack of emphasis on physical training, particularly in sprinting, during basketball extracurricular activities might be the reason for this result. Regular practice is recommended to enhance performance.

Agility, measured through the T Test, showed that 65% of students fell into the "poor" category. Agility is crucial in basketball for maneuvers such as dribbling and evading opponents. The lack of agility might stem from inadequate training in tests like T Test and shuttle run. The research aims to encourage students to engage more actively in physical assessments for better self-awareness and performance. Push-up tests, assessing upper body strength, revealed that 70% of students achieved a "moderate" rating. Adequate upper body strength is essential for various basketball techniques, including shooting and dribbling. The study suggests that with consistent training, students can improve their push-up results and overall performance in basketball. The Bleep Test assessed endurance, with 65% falling into the "poor" category. Endurance is vital in basketball due to the continuous movement involved. Lack of endurance might result from insufficient jogging and aerobic exercise. The findings underscore the importance of incorporating endurance-building activities in basketball training. Muscle Explosive Power Measurement: Vertical Jump tests, evaluating muscle explosive power, showed that 45% of students achieved an "excellent" rating. Muscle explosive power is crucial for actions like jump shots in basketball. The study suggests that the majority of students have good muscle explosive power, providing a solid foundation for various basketball movements.

The overall results of all tests showed that the majority of students (38%) fell into the "mo-derate" category. This implies a balanced performance across speed, agility, strength, endurance, and muscle explosive power. Regular physical assessments are encouraged to monitor and enhance students' physical capabilities.

CONCLUSION

Based on the analysis of the research titled "Application of Physical Fitness Test Measurement in Basketball Sports Branch Using Applications on Students of Palembang 03 Public Junior High School," the overall average results for both male and female students in categories such as excellent for speed, agility, strength, endurance, and muscle explosiveness are 9%. Additionally, the "good" category has an average of 7%, while the "moderate" category is 38%. On the other hand, the "poor" category comprises 27%, and the "very poor" category makes up 19%. In conclusion, the highest average achievement by students of Palembang 03 Public Junior High School participating in basketball extracurricular activities falls under the "moderate" category, constituting 38%.

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