



## Assessment of Learning in the Topic of Karate Martial Arts Using the TKPN Test Application

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### Abstract

This study examined students' physical fitness in the karate learning module using the TKPN test application. A quantitative descriptive cross-sectional design was employed, involving 30 Grade VIII students from SMP Negeri 16 Palembang (20 males and 10 females). Five components were assessed using TKPN: body mass index (BMI), flexibility (V sit-and-reach), muscular endurance (sit-ups), whole-body endurance (squat thrusts), and cardiorespiratory endurance (PACER). The results showed that 90% of both male and female students were categorized as having nutritional well-being. Flexibility levels were predominantly poor, with 80% of males and 90% of females classified in the poor category. Muscular endurance results indicated that 55% of males fell into the poor category, and only 5% reached the good category, while females demonstrated better performance, with 40% achieving good muscular endurance. Cardiorespiratory endurance was generally low, with 70% of males and 80% of females scoring in the poor category. Composite TKPN fitness scores placed both groups in the "fair" fitness category, with mean values of 2.2 for males and 2.6 for females. Overall, the TKPN application facilitated faster and more efficient data processing, providing teachers with a practical and systematic tool for monitoring students' physical fitness in karate learning. Digital-based assessment shows strong potential for supporting consistent and accurate evaluation in physical education, although further research with larger and more diverse samples is recommended to validate and expand these findings.

**Keywords:** assessment of learning, TKPN application, martial arts karate.



## Introduction

Physical education is a branch of science aimed at influencing the physical and mental development of children by engaging them in well-structured physical activities. According to [Rahmadani Fitri \(2023\)](#), physical education is an integral part of the overall educational process. Its purpose is to develop physical fitness, motor skills, critical thinking abilities, social skills, reasoning, emotional stability, moral actions, healthy lifestyle habits, and environmental awareness through systematically planned physical, sports, and health-related activities. In other words, physical education is an effort by educators to enhance students' physical and mental well-being, while also supporting other aspects essential for social development.

According to [Zebua \(2024\)](#), assessment is the process of gathering data or information from learning activities. In physical education, assessment is a crucial component that must be conducted by teachers to evaluate the extent to which learning objectives have been achieved. Hart (in [Kurniawati, 2017](#)) defines assessment as the process of collecting data or information about students regarding what they know and what they can do. Based on these two perspectives, assessment can be concluded as a key element in physical education to evaluate the learning process and determine the success of student learning outcomes.

According to [Anisah \(2022\)](#), assessment of learning remains the dominant approach used in schools. The aim of this approach is to identify and confirm learning outcomes and to report them to students and their parents. This form of assessment is widely accepted by both parents and the broader community. Assessment of learning helps distinguish between students who have learned effectively and those who have not.

Good physical fitness is characterized by an individual's ability to engage in physical activity or exercise without experiencing excessive fatigue, and still having enough energy reserves to continue with the next activity without feeling overly tired. This aligns with [Destriana et al. \(2023\)](#), who state that physical fitness refers to the ability of an individual or group to perform daily physical activities optimally while still having enough strength to carry out subsequent tasks without any signs of fatigue.

According to [Pramata \(2016\)](#), karate is a form of martial arts that involves physical movements using both the hands and feet, such as punches, blocks, and kicks. Meanwhile, [Purwaningtias Deasy](#) describes karate as a traditional Japanese martial art that originated in Okinawa in 1896, where techniques known as *te* or *Okinawa-te* were first demonstrated. In 1929, many practitioners brought

their own karate styles from Okinawa to mainland Japan, leading to its further development. Karate has been found to influence fitness levels; according to [Maweikere et al. \(2022\)](#), there is a significant relationship between physical fitness and nutritional status among karate athletes. However, fitness testing often still relies on outdated equipment, which affects the accuracy and duration of the assessments.

Instructional media refers to tools or elements used to deliver content that can be effectively received by students. In today's era, technology plays a major role in advancing the education sector. Through technological media, teachers can also carry out student assessments. In physical education, technology-based tools—such as applications or web platforms—can be used to evaluate learning or conduct fitness tests, provided they meet the required functional standards. According to [Hartati, Destriana, and Aryanti \(2016\)](#), the rapid and global development of science and technology has compelled higher education institutions to continuously improve the quality of teaching and learning in order to produce competent graduates. The digital transformation in education has accelerated the shift toward technology-based assessment tools, enabling more efficient data processing and learning analytics ([Zain, 2021](#)). From this statement, it can be inferred that technology is essential in achieving educational goals.

Based on the observations conducted at State Junior High School 16 Palembang, it was found that the school still uses manual methods for conducting physical fitness tests. The use of the TKPN application in assessing physical fitness is expected to assist teachers in saving time during the evaluation process. According to [Hartati \(2019\)](#), with the advancement of science and technology in the field of sports, significant progress has been made in both coaching knowledge and physical testing. In this era of globalization, it is recommended that test results be processed using computer-based applications or software that can record and calculate all test data and help determine the athlete's physical fitness level.

From the explanation above, it can be concluded that the TKPN application plays a vital role in managing both fitness assessments and technical aspects of martial arts, particularly karate. Lots of schools still stick with manual testing for physical education, even though it eats up time and mistakes slip through. Not many researchers have looked into how well digital TKPN works for karate classes in Indonesian junior high schools, especially when it comes to saving time. In this study, I set out to do two things: first, to show how students perform in karate when we use the TKPN app, and second, to see if the app actually

makes data processing faster and easier compared to the old manual way.

## Methods

### Research Design

This study employed a quantitative descriptive cross-sectional design to assess students' physical fitness during the karate learning module. The cross-sectional approach allowed data to be collected at a single point in time, providing an overview of students' fitness profiles based on the components measured using the Tes Kebugaran Pelajar Nusantara (TKPN) application. This design is commonly used in school-based physical education research to evaluate physical fitness status without implementing treatment or intervention.

### Participants

The participants were 30 Grade VIII students (20 males and 10 females) from SMP Negeri 16 Palembang who were enrolled in the karate learning module. Purposive sampling was applied to include students who met the following criteria:

1. actively participated in physical education classes during the study period;
2. were present on the day of fitness testing; and
3. had no injuries or health conditions that prevented participation in physical fitness tests.

Students with recent acute injuries or medical limitations were excluded from testing. Prior to data collection, permission was obtained from the school administration, and written informed consent was collected from parents/guardians. All students also provided verbal assent. The study procedures adhered to school safety protocols and ethical principles for conducting research involving minors.

### Instrument

The TKPN (Tes Kebugaran Pelajar Nusantara) application was used as the primary instrument for measuring physical fitness. TKPN is a digital platform developed to assess school-aged students' fitness through standardized national norms and automated scoring. Five test components were administered:

1. Body Mass Index (BMI): calculated from height and weight measurements to categorize nutritional status (malnutrition, normal, overnutrition, obesity).
2. Flexibility (V Sit-and-Reach): measures hamstring and lower back flexibility, categorized into very poor, poor, fair, good, and excellent.

3. Muscular Endurance (Sit-Up Test, 60 seconds): counts the number of sit-ups performed, classified into five performance levels.
4. Whole-Body Endurance (Squat Thrust Test, 30 seconds): assesses total-body endurance and coordination through repeated squat thrust movements.
5. Cardiorespiratory Endurance (PACER Test): conducted following the standardized 20-meter shuttle run protocol; TKPN converts total laps into category scores.

All raw scores were directly entered into TKPN, which automatically calculated performance categories and generated the composite fitness score.

### Procedure

Data collection was carried out during scheduled physical education sessions. The procedure consisted of the following steps:

1. Preparation: The teacher and research team prepared the testing stations (BMI, sit-and-reach box, sit-up mat, squat thrust area, and PACER track). Students received instructions and demonstrations for each test component.
2. Warm-Up: A standardized 10-minute warm-up session was implemented consisting of light jogging, dynamic stretching, and mobility exercises to ensure readiness and reduce injury risk.
3. Testing Sequence: Tests were administered in the following order to minimize fatigue effects: (1) BMI measurement, (2) V sit-and-reach, (3) sit-up, (4) squat thrust, and (5) PACER test. Students rotated through stations in small groups under teacher supervision.
4. Data Input: All test results were recorded and entered into the TKPN application immediately after completion of each station. TKPN automatically generated individual and class-level reports.
5. Safety and Monitoring: Throughout the procedure, the teacher monitored test execution to ensure student safety and correct technique.

### Data Analysis

Data exported from the TKPN application were analyzed descriptively using Microsoft Excel. Frequency distributions and percentages were calculated for each performance category within all fitness components. TKPN applies a weighted

scoring system to generate a composite fitness index, where each component contributes differently to the overall score:

1. PACER: 50%
2. Sit-up: 20%
3. Squat thrust: 20%
4. V Sit-and-reach: 10%

The composite fitness score for each student was calculated using the formula: Composite Score =  $\sum(\text{Component Value} \times \text{Weight})$

The resulting scores were then classified according to the TKPN categories: >4 = excellent; 3–3.9 = good; 2–2.9 = fair; 1–1.9 = poor; <1 = very poor.

The final analysis focused on gender-based comparisons and overall fitness classification to describe students' fitness profiles within the karate learning module.

## Results

The results of the application-based physical fitness assessment are presented in three tables. Table 1 shows the distribution of BMI categories for male and female students. Table 2 summarizes the classification outcomes for four fitness components (flexibility, muscular endurance, coordination/agility/balance, and cardiorespiratory endurance). Table 3 reports the composite TKPN fitness scores based on weighted proportions for each component.

Most students fell within the normal nutritional well-being category (90% male; 90% female). Overnutrition was identified in 10% of males and 10% of females, with no cases of underweight or obesity.

Flexibility scores were predominantly poor (80% male; 90% female). Muscular endurance showed a wider distribution: most males fell into

poor or fair categories, while females showed higher percentages in good performance (40%). Cardiorespiratory endurance, assessed using the PACER, showed low performance for both sexes, with 70% of males and 80% of females classified as poor.

Composite scores indicated that both male (2.2) and female (2.6) students fall within the fair fitness category. The PACER component contributed the highest weight (50%) and had the greatest downward impact on total scores due to its predominantly poor classifications.

## Discussion

Aligned with the study objective: "to analyze students' physical fitness using the TKPN digital assessment application and compare digital vs. manual assessment approaches.

The purpose of this study was to analyze the physical fitness levels of Grade VII students using the TKPN application and to evaluate how digital assessment improves the accuracy and efficiency of the fitness testing process compared with conventional manual assessment. Overall, the findings show that students at SMP Negeri 16 Palembang fall within the \*fair\* fitness category, while the use of the TKPN application substantially streamlined data processing and minimized human error. The discussion in the following sections connects the study's results with previous research and the broader context of assessment practices in physical education.

Manual assessment methods remain widely used in schools, including at SMP Negeri 16 Palembang. As described by Wikarya et al. (2018), conventional assessment relies on written tests, direct observations, and manual scoring. This method is simple, low-cost, and aligns with

**Table 1**  
*BMI Classification of Students by Sex*

Category	Male (n = 20)	Female (n = 10)
Malnutrition	0 (0%)	0 (0%)
Nutritional well-being	18 (90%)	9 (90%)
Overnutrition	2 (10%)	1 (10%)
Obesity	0 (0%)	0 (0%)

*Note. BMI classification based on TKPN standards.*

**Table 2**  
*Fitness Component Classification by Sex Across Four TKPN Tests*

Category	Flexibility n (%)		Sit-Up n (%)		Squat Thrust n (%)		PACER n (%)	
	Male	Female	Male	Female	Male	Female	Male	Female
Very Poor	0 (0%)	0 (0%)	1 (5%)	1 (10%)	0 (0%)	0 (0%)	6 (30%)	1 (10%)
Poor	16 (80%)	9 (90%)	11 (55%)	5 (50%)	11 (55%)	5 (50%)	14 (70%)	8 (80%)
Fair	4 (20%)	1 (10%)	7 (35%)	3 (30%)	5 (25%)	3 (30%)	0 (0%)	0 (0%)
Good	0 (0%)	0 (0%)	1 (5%)	4 (40%)	3 (15%)	2 (20%)	0 (0%)	1 (10%)
Excellent	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (5%)	0 (0%)	0 (0%)	0 (0%)

*Note. All test classifications follow TKPN normative scoring for each component.*

**Table 3***Composite TKPN Fitness Scores Based on Weighted Proportions*

Component	Weight (%)	Male Score	Female Score
<b>PACER</b>	50%	1.0	1.0
<b>Sit-Up</b>	20%	0.4	0.8
<b>Squat Thrust</b>	20%	0.6	0.6
<b>V Sit-and-Reach</b>	10%	0.2	0.2
<b>Total Composite Score</b>	—	<b>2.2</b>	<b>2.6</b>
<b>Fitness Category</b>	—	<b>Fair</b>	<b>Fair</b>

*Note.* Composite scores follow the TKPN rubric: >4 = Excellent; 3–3.9 = Good; 2–2.9 = Fair; 1–1.9 = Poor; <1 = Very Poor.

teachers' current assessment competencies. These advantages are consistent with Sari (2019), who noted that traditional approaches allow learning objectives to be achieved effectively within the allotted instructional time.

However, manual assessment has notable limitations. The process is time-consuming, susceptible to scoring inconsistencies, and inefficient when used for testing multiple components across large groups of students. Kharizma et al. (2024) highlighted that such methods tend to reduce student engagement and may limit the meaningfulness of learning experiences. In this study, PE teachers reported similar challenges, particularly during the calculation and recording of fitness test outcomes.

Digital assessment incorporates technology to record, calculate, store, and analyze fitness results. As Satria et al. (2021) stated, digital tools are increasingly essential in physical education, particularly for enhancing accuracy and accountability. The TKPN application used in this study offered several advantages—automated scoring, structured data storage, standardized norms, and immediate result processing.

These benefits mirror Kresnapati et al. (2020), who emphasized the superiority of digital systems in minimizing calculation errors and increasing assessment efficiency. Despite these advantages, digital assessment has challenges, including the need for adequate devices, stable internet, and teacher technological readiness. Adawiyah & Haolani (2021) reported similar obstacles in digital-based school assessment environments.

In this study, however, the TKPN app proved highly functional and significantly assisted the PE teacher in evaluating each student's fitness status efficiently and accurately.

The V Sit and Reach results indicate that most students fall within the poor–fair range. Flexibility is crucial in karate due to its influence on kicking range, body control, and injury prevention. Prior research supports this: Afrizal (2018) found that lumbar flexibility improves kicking accuracy, while Hasyim (2020) emphasized its importance for movement efficiency. Thus, students' low flexibility scores highlight a key area for instructional improvement in the karate module.

Sit-up results showed generally fair but not optimal endurance levels. Muscular endurance plays a significant role in karate, especially for maintaining technique consistency across rounds. Firmansah (2021) and Azhari et al. (2020) emphasized that stronger core muscles directly enhance kicking and punching power while reducing injury risk. The “poor” category obtained by many students suggests the need for strengthening interventions as part of the PE curriculum.

Squat Thrust performance fell mainly in the fair–poor categories. This result is important because these components—coordination, balance, agility—are foundational in karate. Marta (2020) and Nur Khofifah et al. (2023) highlight that efficient movement patterns in martial arts depend on well-developed coordination, allowing movements to be integrated smoothly while minimizing energy expenditure. Students' low scores indicate limited physical readiness for advanced skill execution.

PACER scores were the lowest across components, with most students falling into the poor and very poor categories. Endurance is essential in karate, as matches require sustained physical effort. Arridho (2021) and Sepriani (2019) emphasized that strong cardiovascular endurance is necessary for maintaining high-intensity performance. The low results observed suggest the need for more structured aerobic conditioning in PE.

The combined TKPN composite scores (male = 2.2; female = 2.6) classify students in the \*fair\* fitness category. This aligns with Sudirman (2024), who stressed that fitness and nutritional status significantly affect physical development during adolescence. The BMI results, mostly indicating normal nutritional well-being, support this finding—suggesting that students' fitness limitations are more related to physical activity patterns than nutritional issues.

The digital assessment provided clear, quantifiable evidence of students' fitness strengths and weaknesses. This supports the goal of the research: to use application-based assessment not only to measure fitness but also to

provide actionable insights for improving PE instruction, particularly in karate.

The findings reinforce Komariah et al. (2024), who argued that learning outcomes are strengthened when assessment aligns with objectives, uses student-centered approaches, and incorporates technology. In this study, the TKPN application helped the PE teacher more accurately monitor students' abilities, identify priority areas for training, and streamline evaluation.

Thus, application-based assessment aligns well with the current needs of physical education: accuracy, efficiency, and evidence-based decision-making. These findings support previous technological innovations in physical testing, where digital platforms improved the accuracy and efficiency of test administration (Hartati, Aryanti, & Victorian, 2020). The integration of TKPN in karate learning aligns with these developments, demonstrating that mobile-based measurement systems can streamline teacher workflow and improve data reliability.

This study demonstrates that Grade VII students show a moderate level of physical fitness, with particular weaknesses in flexibility and endurance. The use of the TKPN application significantly improved the assessment process, providing accurate, real-time analysis that would be difficult to achieve through manual evaluation.

Overall, the findings support the integration of digital assessment tools in PE classes, particularly in skill-intensive subjects like karate, where detailed monitoring of physical readiness is essential.

## Conclusions

This study examined the physical fitness levels of Grade VII students at SMP Negeri 16 Palembang using the TKPN digital assessment application. The findings show that students generally demonstrated *moderate* fitness levels across BMI, flexibility, muscular endurance, coordination, and cardiorespiratory endurance components. The composite scores (male = 2.2; female = 2.6) placed both groups in the "fair" category based on TKPN standards. These results highlight specific areas—particularly flexibility and cardiovascular endurance—that require greater instructional attention within the karate module of physical education.

A key contribution of this study lies in demonstrating how digital assessment tools such as the TKPN application can significantly improve the efficiency, accuracy, and consistency of fitness evaluations in school settings. The app minimized human error, accelerated data processing, and offered standardized scoring aligned with national fitness norms. For teachers, this provides clearer

insights for planning instructional interventions, monitoring student progress, and supporting data-driven physical education practices. For students, the digital feedback fosters greater awareness of their physical fitness status and encourages healthier habits and active participation in PE classes.

This research has several limitations. First, the sample size was relatively small (N = 30) and limited to a single school, which restricts the generalizability of the findings. Second, the study focused only on descriptive analysis, without examining causal factors that may influence fitness outcomes—such as physical activity habits, nutrition, lifestyle, or psychosocial variables. Third, the implementation relied on a single digital tool (TKPN), leaving unexplored how different assessment technologies may compare in terms of usability and accuracy.

Future research should involve larger and more diverse populations across multiple schools to strengthen external validity. Studies integrating digital assessment with intervention programs (e.g., flexibility training, endurance conditioning) would provide deeper insight into improving student fitness. Additionally, comparative studies examining various assessment applications could help identify the most effective digital tools for physical education.

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