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The Level of Knowledge of Table Tennis Among Students

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ABSTRACT

This study aims to analyze the level of knowledge of Grade XII students at State High School 6 Padang regarding table tennis, focusing on three essential aspects: equipment, basic techniques, and game rules. Adequate cognitive understanding of these components is a fundamental prerequisite for effective skill acquisition and meaningful learning in Physical Education, Sports, and Health (PJOK). However, empirical evidence regarding students' actual knowledge levels in table tennis remains limited, particularly at the senior high school level. To address this issue, this study employed a quantitative descriptive research design. The population consisted of 175 Grade XII students, from which a sample of 50 students was selected using purposive sampling based on active participation in PJOK lessons. Data were collected through a structured questionnaire supported by documentation and analyzed using descriptive statistics in the form of percentages. The results indicate that students' knowledge of table tennis equipment was predominantly in the good category (60%), followed by adequate (34%) and poor (6%). In terms of basic techniques, 50% of students demonstrated good knowledge, 22% adequate knowledge, while 14% were classified as poor to very poor, indicating notable deficiencies in technical understanding. Knowledge of game rules showed relatively better distribution, with 8% of students categorized as very good, 48% good, 28% adequate, and 16% poor to very poor. Overall, the findings suggest that students' knowledge of table tennis is generally good; however, gaps remain, particularly in technical mastery and comprehensive understanding of game regulations. These results highlight the need for instructional strategies that integrate theoretical understanding with practical application. The findings are expected to serve as an empirical basis for PJOK teachers in evaluating and improving table tennis learning practices in secondary schools.

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INTRODUCTION

Physical Education, Sports, and Health (PJOK) constitutes a strategic component of formal education aimed at fostering holistic student development across cognitive, affective, and psychomotor domains (Hidayat et al., 2023; Bailey et al., 2023). Contemporary physical education paradigms emphasize learning through movement

rather than merely learning about movement, positioning physical activity as both content and medium of instruction (Chen & Liu, 2022; Darni, 2018). Within this framework, PJOK is expected not only to enhance physical fitness and motor competence but also to strengthen psychological attributes such as motivation, discipline, and resilience, which are critical determinants of sustained participation and performance in sports contexts (Masrun, 2019; Ntoumanis et al., 2021).

In Indonesia, PJOK implementation is mandated by Law of the Republic of Indonesia Number 20 of 2003 concerning the National Education System, which explicitly positions physical education as a compulsory subject from elementary through secondary education levels (Mustafa, 2022). Despite this strong regulatory foundation, empirical evidence indicates that PJOK learning outcomes particularly in skill-based sports—often fall short of curricular expectations due to constraints related to time allocation, instructional methods, and facility availability (Pratama et al., 2022; Rahmawati et al., 2021). These challenges are particularly evident in sports that require technical precision and cognitive understanding, such as table tennis.

Table tennis is widely recognized as an effective medium for developing fine motor coordination, reaction speed, concentration, and eye-hand coordination, making it pedagogically valuable at the secondary school level (Junaidi et al., 2023; Sutarmin, 2007). However, mastering table tennis requires not only physical execution but also adequate conceptual knowledge regarding equipment specifications, stroke mechanics, and game regulations (Haryanto, 2023). In practice, students' limited understanding of these foundational aspects often translates into suboptimal performance and reduced learning motivation (Zhang et al., 2012). Observations in Indonesian senior high schools suggest that table tennis instruction frequently prioritizes limited practical drills without systematic reinforcement of conceptual knowledge, thereby weakening students' overall mastery of the sport.

Recent international and national studies have increasingly emphasized the importance of integrating cognitive knowledge with motor learning in physical education to optimize skill acquisition and long-term retention (Bailey et al., 2023; Kirk & Macdonald, 2021). Research in racket sports education demonstrates that students with stronger conceptual understanding of techniques and rules exhibit superior execution accuracy and tactical decision-making (García-González et al., 2020; J. Haryanto et al., 2023). In table tennis specifically, forehand and backhand strokes—including backhand lobs—are identified as the most frequently utilized techniques, requiring precise biomechanical coordination and anticipatory skills (Kondrič et al., 2019).

Empirical studies conducted in Asian educational contexts report that students' declarative knowledge of table tennis significantly correlates with their procedural skill performance and learning engagement (Liu et al., 2021; Zhang et al., 2019). Furthermore, adequate practice time combined with structured instructional strategies has been shown to enhance both knowledge acquisition and motor proficiency (Sari et al., 2025; Renshaw et al., 2019). Within Indonesian settings, however, most PJOK-related studies have focused predominantly on physical fitness outcomes or training interventions, with

relatively limited attention given to diagnostic analyses of students' sport-specific knowledge levels (Padli et al., 2023; Pratama et al., 2022).

Although the pedagogical significance of cognitive knowledge in sports learning is well established, there remains a notable gap in empirical research examining students' knowledge levels in table tennis within Indonesian senior high schools. Existing studies tend to emphasize either technical skill improvement through experimental training models or general physical fitness assessments, without systematically mapping students' understanding of equipment functions, basic stroke techniques, and game rules as an integrated knowledge construct (Rahmawati et al., 2021; Padli et al., 2023).

Moreover, limited research has employed descriptive–diagnostic approaches to identify knowledge deficiencies as a basis for instructional improvement, particularly at the Grade XII level where students are expected to demonstrate higher-order understanding and autonomous learning capacities. This lack of baseline knowledge profiling constrains teachers' ability to design adaptive, evidence-based PJOK instruction that aligns with students' actual learning needs. Consequently, there is an urgent need for context-specific research that provides empirical insights into students' table tennis knowledge levels as a foundation for pedagogical decision-making.

Based on the identified gaps, this study aims to analyze the level of table tennis knowledge among Grade XII students at SMA Negeri 6 Padang, focusing on three core dimensions: understanding of equipment, mastery of basic techniques, and comprehension of game rules. By adopting a descriptive analytical approach, this research seeks to generate empirical evidence that can inform PJOK teachers in evaluating current instructional practices and developing more effective, student-centered learning strategies.

The novelty of this study lies in its systematic profiling of students' cognitive knowledge in table tennis within an Indonesian senior high school context, an area that remains underexplored in existing literature. Unlike prior studies that prioritize performance outcomes or intervention effects, this research positions knowledge analysis as a critical diagnostic tool for instructional improvement. The findings are expected to contribute both theoretically by enriching the discourse on cognitive dimensions of sports learning and practically by providing actionable insights for enhancing the quality of table tennis instruction in PJOK curricula. Ultimately, this study supports the broader goal of strengthening evidence-based physical education practices aligned with national education standards and international pedagogical trends.

METHODS

This study employed a quantitative research method with a descriptive analytical approach, aimed at systematically describing the level of students' knowledge of table tennis without implementing experimental treatment or instructional intervention (Creswell & Creswell, 2018; Fraenkel et al., 2019). A descriptive approach is considered appropriate when the primary objective of the research is to map existing conditions, identify tendencies, and generate baseline empirical data that can support pedagogical

evaluation and future instructional development in physical education contexts (Sukmadinata, 2020; Cohen et al., 2018).

The research was conducted at State High School 6 Padang (SMA Negeri 6 Padang) on 19 November 2025, following the completion of all administrative and ethical approval procedures. The study population consisted of 175 Grade XII students, representing the final stage of secondary education where students are expected to demonstrate adequate conceptual understanding and autonomous learning capabilities in Physical Education, Sports, and Health (PJOK)(Bailey et al., 2023; Kirk & Macdonald, 2021). Sampling was carried out using purposive sampling, a non-probability sampling technique that allows researchers to select participants based on specific characteristics relevant to the research objectives (Etikan et al., 2016; Palinkas et al., 2015). The selected sample comprised 50 male students who actively participated in PJOK classes and had received table tennis instruction, ensuring data relevance and content validity.

The main research variable was students' level of knowledge in table tennis, operationally defined as students' cognitive understanding of three core dimensions: (1) table tennis equipment, (2) basic stroke techniques, and (3) game rules. These dimensions align with contemporary physical education frameworks that emphasize the integration of declarative knowledge and procedural competence in sports learning (García-González et al., 2020; Liu et al., 2021). Knowledge assessment is increasingly recognized as a crucial predictor of motor performance, tactical awareness, and sustained engagement in sports activities (Kondrič et al., 2019; Ntoumanis et al., 2021).

Data were collected using a closed-ended questionnaire developed based on curriculum content and relevant literature in table tennis pedagogy (Haryanto, 2023; Junaidi et al., 2023). The instrument consisted of 30 items employing a Guttman scale (true–false), which is suitable for measuring factual and conceptual knowledge with clear response categories (Taherdoost, 2019). Prior to data collection, the instrument underwent validity and reliability testing to ensure measurement accuracy. Reliability analysis using Cronbach's Alpha yielded a coefficient of 0.918, indicating excellent internal consistency and confirming the instrument's reliability for educational research purposes (Hair et al., 2019; Tavakol & Dennick, 2011).

The collected data were analyzed using descriptive statistical techniques, specifically percentage analysis, to determine students' knowledge levels across the assessed dimensions (Sudijono, 2012; Field, 2018). The results were subsequently classified into five categories—very good, good, fair, poor, and very poor—to facilitate clear interpretation and practical application in educational settings. This analytical approach is consistent with prior descriptive studies in physical education that aim to provide diagnostic insights for instructional improvement rather than causal inference (Padli et al., 2023; Pratama et al., 2022).

Overall, the methodological design of this study ensures rigor, relevance, and alignment with contemporary standards in educational and sports science research, providing a solid empirical foundation for evaluating students' table tennis knowledge and informing evidence-based PJOK instruction.

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RESULTS AND DISCUSSION

Result

Table Tennis Techniques

Based on the results of the questionnaire analysis on table tennis techniques in physical education classes at Padang State High School 6, 10 questions were given to 50 students as respondents to obtain research data.

Table 1.
Table Tennis Game Technique Data Processing Results

Interval	Frecuency		Category
	Absolute	Relative	
≥11	0	0%	Very good
9-10	25	50%	Good
7-8	11	22%	Fair
5-6	7	14%	Poor
≤4	7	14%	Very poor
Total	**50**	**100%**	

Based on the results of the analysis of table tennis game data among students at Padang State High School 6, the results varied. No students were in the "very good" category (0%), while 25 students (50%) were in the "good" category, 11 students (22%) were in the "fair" category, and 7 students (14%) were in the 'poor' and "very poor" categories, respectively. These findings indicate that most students have good knowledge, but there is still a need to improve their understanding of table tennis techniques. To clarify the results of the sub-variables of table tennis techniques in physical education, health and sports education (PJOK) learning, see the following figure:

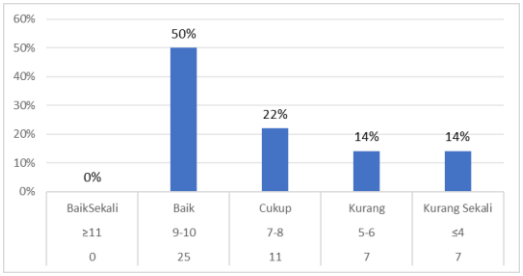

Figure 1.
Histogram Of Research Results On Table Tennis Techniques

The results of the analysis show that table tennis learning has not been implemented optimally. No students achieved the excellent category (0%), while 25 students (50%) were in the good category, 11 students (22%) in the fair category, and 7 students (14%) each in the poor and very poor categories. This indicates that most students have not been able to apply their table tennis technical knowledge effectively in accordance with the objectives of physical education, health, and sports (PJOK) learning.

Table Tennis Equipment

Based on the results of the questionnaire analysis on the sub-variable of table tennis equipment in PJOK learning at SMA Negeri 6 Padang, 10 questions were given to 50 students as respondents to obtain research data.

Table 2.
Results of Data Processing for Table Tennis Equipment

Interval	Frecuency		Category
	Absolute	Relative	
≥12	0	0%	Very good
8-11	30	60%	Good
4-7	17	34%	Fair
2-3	2	4%	Poor
≤2	1	2%	Very poor
Total	**50**	**100%**	

Based on the results of data analysis regarding table tennis equipment among students at Padang 6 Public High School, varied results were obtained. No students achieved the excellent category (0%), while 30 students (60%) were in the good category, 17 students (34%) in the fair category, 2 students (4%) in the poor category, and 1 student (2%) in the very poor category. These findings indicate that most students have good knowledge of table tennis equipment, but there is still a need to improve their understanding in this area. To clarify the achievements of this sub-variable, see the following figure.

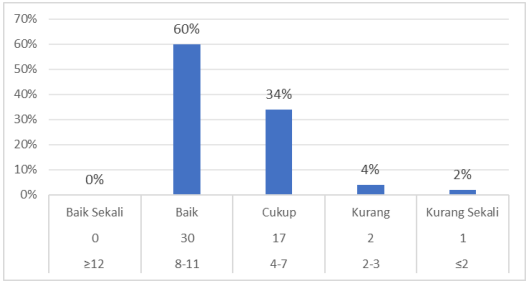

Figure 2.
Histogram Of Research Results On Table Tennis Equipment

The results of the analysis show that table tennis learning has not been optimal. No students achieved the excellent category (0%), while 30 students (60%) were in the good category, 17 students (34%) in the fair category, and 2 students (4%) and 1 student (2%) in the poor and very poor categories, respectively. These findings indicate that most students have not fully understood how to use table tennis equipment effectively in accordance with the objectives of physical education, health, and sports (PJOK) learning.

Table Tennis Rules

Based on the results of the questionnaire analysis on the sub-variable of table tennis rules in PJOK learning at SMA Negeri 6 Padang, 10 questions were given to 50 students as respondents to obtain research data.

Table 3.
Results of Data Processing for Table Tennis Equipment

Interval	Frecuency		Category
	Absolute	Relative	
≥10	4	8%	Very good
8-9	24	48%	Good
6-7	14	28%	Fair
4-5	7	14%	Poor
≤3	1	2%	Very poor
Total	**50**	**100%**	

Based on the results of data analysis on the aspects of table tennis rules at SMA Negeri 6 Padang, varied results were obtained. A total of 4 students (8%) were in the excellent category, 24 students (48%) were in the good category, 14 students (28%) were in the fair category, 7 students (14%) were in the poor category, and 1 student (2%) was in the very poor category. These findings indicate that most students have a good understanding of table tennis rules, although improvements are still needed to optimize their understanding. To clarify the results of this sub-variable, see the following figure:

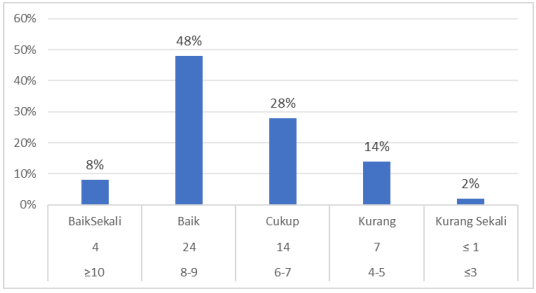

Figure 3.
Histogram Of Research Results On Table Tennis Rules

The results of the analysis show that table tennis learning from the aspect of student knowledge has not been optimal. A total of 4 students (8%) were in the excellent category, 24 students (48%) in the good category, 14 students (28%) in the fair category, and 7 students (14%) and 1 student (2%) in the poor and very poor categories, respectively. These findings indicate that most students do not yet fully understand and apply the rules of table tennis correctly.

Discussion

Table Tennis Equipment Knowledge

The results of this study indicate that students' knowledge of table tennis equipment is still at a fair-to-good level, but has not yet reached the optimal category. The absence of students in the "very good" category indicates that students' understanding of the functions, specifications, and use of table tennis equipment—such as the table, net, racket, and ball—is not yet fully comprehensive. This finding aligns with research by Kullal et al. (2024), which emphasized that a lack of integrated understanding of sports equipment directly impacts the quality of technical learning and game efficiency.

In the context of Physical Education (PJOK), equipment knowledge is a cognitive foundation that supports motor skills and physical activity safety (Bailey et al., 2023; Hardman & Green, 2020). Students who understand equipment characteristics, such as racket thickness, rubber type, and ball bounce, tend to be more adaptive in controlling shots and implementing game strategies (Zhao & Su, 2021). Kondrič et al. (2022) emphasized that a good understanding of equipment not only improves technical performance but also reduces the risk of injury from using inappropriate equipment.

The low distribution of "very good" scores in this study indicates the need to strengthen experiential learning. Physical Education (PJOK) teachers play a strategic role as active facilitators through demonstrations of equipment usage, repeated

practice, and corrective feedback (Al-Hikam, 2022; Kirk & Macdonald, 2021). Furthermore, the availability of adequate and standardized facilities is a determining factor in the success of practice-based learning (Pratama et al., 2022). Therefore, improving knowledge of table tennis equipment should be seen as a crucial prerequisite for optimizing overall technique and game learning.

Table Tennis Technique Knowledge

Students' knowledge of table tennis techniques showed a more concerning trend than that of equipment, particularly in the stroke technique sub-indicator. The absence of students in the "very good" category and the continued presence of "poor" and "very poor" categories indicate a gap between the objectives of PJOK learning and students' cognitive achievements. These findings reinforce the argument that technical mastery is determined not only by physical practice but also by a strong conceptual understanding (García-González et al., 2020; Yu et al., 2020).

Basic table tennis techniques—including grip, stance, footwork, and stroke—are fundamental components that are integrated in building game performance (Mardianto, 2021; Kondrič et al., 2019). Low scores on stroke techniques such as drives, pushes, blocks, and smashes indicate that learning does not fully emphasize the relationship between biomechanical principles, tactical objectives, and the real-world context of play. A study by Liu et al. (2021) showed that students with low technical understanding tend to experience difficulties in decision-making and shot consistency during play.

To address this issue, a more structured and student-centered learning approach needs to be implemented. Hands-on practice models combined with visual demonstrations have been shown to be effective in improving technical understanding and movement accuracy (Renshaw et al., 2019; Sari et al., 2025). Furthermore, gradual learning from simple to complex techniques, regular evaluation, and the use of interactive media can increase student motivation and knowledge retention (Ntoumanis et al., 2021; Chen & Liu, 2022). With a systematic and sustainable approach, students' knowledge gaps in table tennis techniques can be significantly minimized.

Table Tennis Rules Knowledge

Students' knowledge of table tennis rules is relatively better than that of equipment and technique, as indicated by the presence of students in the "very good" category and a predominance of students in the "good" category. However, the continued presence of students in the "poor" and "very poor" categories indicates that rule understanding is not evenly distributed. Game rules play a strategic role in developing tactical awareness, sportsmanship, and decision-making in the game (Kirk & Macdonald, 2021; Bailey et al., 2023).

Understanding the rules, particularly those related to serving, scoring systems, and fouls, is fundamental to the correct application of techniques and strategies in matches (Gómez et al., 2018; Zhang et al., 2019). This research confirms that purely theoretical rules learning tends to be less effective if not integrated with real-life game simulations. Therefore, active learning strategies such as discussions of foul cases, mini-game simulations, and guided questioning need to be optimized to connect rule concepts to field practice (Hardman & Green, 2020; Al-Hikam, 2022).

Overall, the findings of this study confirm that the table tennis knowledge of 12th-grade students at SMA Negeri 6 Padang still requires strengthening, particularly in terms of technique and equipment. Integrating cognitive learning and motor practice, supported by adequate facilities and teacher pedagogical competence, is key to sustainably improving the quality of physical education (PJOK) instruction.

CONCLUSION

Based on the results of data analysis and empirical discussion, this study concludes that learning outcomes in Physical Education, Sports, and Health (PJOK), particularly in table tennis, are strongly influenced by the integration of cognitive knowledge and technical skill mastery. The findings indicate that Grade XII students at State High School 6 Padang generally possess a basic level of knowledge regarding table tennis equipment, techniques, and game rules; however, this knowledge has not yet reached an optimal level that supports effective skill execution and tactical understanding. Although students are familiar with the types and functions of table tennis equipment, their ability to apply this knowledge accurately and consistently in accordance with official rules and technical principles remains limited.

Empirically, deficiencies are most evident in students' understanding of technical aspects, especially stroke techniques, which require not only repeated practice but also a strong conceptual foundation. These results reinforce the view that technical proficiency in table tennis cannot be developed solely through physical drills without adequate theoretical reinforcement. Therefore, PJOK teachers are encouraged to adopt instructional strategies that systematically integrate theoretical explanations with intensive, varied, and context-based practice activities. Creative learning approaches, supported by demonstrations, interactive media, and continuous formative evaluation, are essential to enhance students' understanding, engagement, and learning outcomes. Ultimately, strengthening students' knowledge of table tennis is a critical prerequisite for improving the overall quality and effectiveness of PJOK instruction at the secondary school level.

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