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Basic Techniques of Forehand And Backhand Strikes In Table Tennis

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ABSTRACT

This study aimed to determine the level of basic forehand and backhand table tennis skills among students at SMK Negeri 1 Poso Pesisir. Mastery of basic techniques is the main foundation in learning table tennis because it influences ball control, shot accuracy, and game effectiveness. This study used a quantitative approach with a descriptive survey design. The sample consisted of 15 male students from class DKV B, selected through purposive sampling. Data collection was conducted using forehand and backhand technique skills tests based on technique and shot accuracy indicators. Data analysis used descriptive statistics in the form of mean, median, standard deviation, and percentage distribution of ability categories. The results showed that basic forehand technique skills had a mean of 50, a median of 47, and a standard deviation of 10, with 53% of students in the high category, 27% in the medium category, and 20% in the very low category. There were no students in the very high or low category. Meanwhile, basic backhand technique proficiency had a mean of 50, a median of 52, and a standard deviation of 10, with 40% of students in the low category, 27% in the moderate category, and 33% in the high category, with no students in the very high category. It can be concluded that students' forehand proficiency is generally good, while their backhand proficiency still requires more intensive development. The results of this survey serve as the basis for planning more systematic table tennis lessons based on student needs.

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INTRODUCTION

Physical education is an integral part of the national education system, aiming to develop the physical, mental, emotional, and social aspects of students through planned, systematic, and sustainable physical activity (Winarno, 2018; Mahendra, 2019). In the modern learning paradigm, physical education is not solely oriented toward physical activity, but also toward mastering specific motor skills, physical literacy, and character development and sportsmanship (Whitehead, 2016; Bailey et al., 2018). One of the sports taught in secondary schools is table tennis, which has been empirically proven to contribute to improved hand-eye coordination, reaction speed, agility, and concentration

in students (Saripin et al., 2018; Kondric et al., 2020). Table tennis is a racket game that requires precise mastery of basic techniques, particularly forehand and backhand strokes, which are the foundation of the game (Zhang et al., 2019; Malagoli Lanzoni et al., 2021). Mastering these two techniques is a prerequisite for developing advanced stroke variations such as drives, pushes, chops, and spins. Biomechanical studies show that forehand and backhand strokes involve complex coordination between trunk rotation, shoulder stability, wrist flexibility, and efficient footwork (Iino & Kojima, 2016; Fuchs et al., 2018). Therefore, failure to master these basic techniques will directly impact poor performance. Initial observations at SMK Negeri 1 Poso Pesisir showed that most students were unable to correctly execute forehand and backhand techniques, including stance, grip, and motor coordination. Common errors included unstable elbow position, poor ball contact timing, and insufficient hip rotation. Furthermore, a less varied learning approach and minimal supervision contributed to low student participation. This situation indicates a gap between the objectives of the physical education curriculum and students' achievement of basic technical skills on the court.

Recent research in sports pedagogy emphasizes the importance of mastering basic techniques as a foundation for long-term performance development (Lidor & Ziv, 2019). In table tennis, forehand and backhand techniques are considered key motor skills that determine successful rallies and game control (Kondric et al., 2020). Kinematic analysis shows that forehand effectiveness is influenced by shoulder angular velocity and trunk rotation, while the backhand requires postural stability and precise forearm control (Iino & Kojima, 2016; Malagoli Lanzoni et al., 2021). An empirical study by Fuchs et al. (2018) showed that structured technique training can improve shot accuracy by up to 23% over an eight-week period. Research by Zhang et al. (2019) confirmed that integrating coordination and footwork training significantly improved forehand drive consistency in adolescent players. Meanwhile, game-based learning approaches and the Teaching Games for Understanding (TGfU) model have been reported to be effective in increasing student engagement in table tennis learning (Harvey & Jarrett, 2016; Otte et al., 2020). In the Indonesian context, several SINTA studies indicate that secondary school students' mastery of basic table tennis techniques remains moderate to low due to a lack of systematic training and standardized instrument-based skill evaluation (Hafiza & Hafidz, 2018; Ahmad Junaidi et al., 2024). Research by Mahendra et al. (2017) confirms that technical ability is significantly influenced by physical fitness components such as coordination, reaction speed, and agility. This is reinforced by Liskustyawati's (2017) findings that the combination of technical training and physical fitness significantly improves game performance. Developments in motion analysis technology and performance evaluation instruments have also been widely used in international table tennis research (Rossi et al., 2022). However, the implementation of school-based basic technical ability surveys in peripheral areas remains relatively limited.

Although various studies have examined the effectiveness of table tennis training methods and learning approaches, most have focused on club athletes or competitive player populations (Malagoli Lanzoni et al., 2021; Rossi et al., 2022). Research in the

context of vocational high schools, particularly in coastal and non-urban areas, remains very limited. This is despite the fact that vocational high school students have different motivational profiles, physical readiness, and sporting backgrounds than public school students and trained athletes. Furthermore, some studies have focused on experimental interventions rather than on initial mapping of basic technical skills through a quantitative descriptive survey approach. However, technical skill surveys are a strategic step in developing needs-based learning plans (needs assessment) and evidence-based teaching (Bailey et al., 2018). No research has been found that specifically maps the basic technical skills of forehand and backhand strokes in students at SMK Negeri 1 Poso Pesisir using comprehensive technical indicators covering initial stance, movement execution, coordination, and shot accuracy. Thus, there is a research gap in the aspect of mapping basic technical skills in the context of physical education in coastal areas of Central Sulawesi.

This research aims to: (1) Describe the level of basic forehand technical skills of students at SMK Negeri 1 Poso Pesisir; (2) Describe the level of basic backhand technical skills of students; (3) Analyze technical skill categories based on biomechanical indicators and shot accuracy results; and (4) Provide learning recommendations based on survey data. The novelty of this research lies in: (1) A comprehensive survey approach based on biomechanical technical indicators, not simply an assessment of shot results; (2) The research context is vocational high schools in coastal areas, which have been underexplored in the national literature; and (3) The integration of technical analysis with a modern sports pedagogy perspective allows the research results to form the basis for developing a table tennis learning model based on student needs.

Theoretically, this research strengthens the literature on the importance of mapping basic technical skills as a foundation for school sports development. Practically, the results of this study can be a reference for physical education teachers in designing more systematic, measurable, and sustainable training programs.

METHODS

This study used a quantitative approach with a descriptive survey design, aimed at mapping students' basic forehand and backhand stroke proficiency levels without providing treatment (Creswell & Creswell, 2018; Sugiyono, 2019). The quantitative approach was chosen because it allows for objective measurement of technical performance through standardized instruments and descriptive statistical analysis to empirically describe students' skill profiles (Thomas, Nelson, & Silverman, 2015; Cohen et al., 2018). In the context of physical education, a technical skills survey is an important initial step in planning needs-based learning (needs assessment) (Bailey et al., 2018; Otte et al., 2020).

The study was conducted at SMK Negeri 1 Poso Pesisir, with a student population enrolled in table tennis lessons. The sample was determined using a purposive sampling technique of 15 students, with the following criteria: (1) actively participating in table tennis lessons, (2) no injuries, and (3) willingness to take the full test. The sample size in

this descriptive study of school-level technical skills was deemed adequate to describe the baseline profile of abilities (Kondric et al., 2020; Harvey & Jarrett, 2016).

The research instrument used a forehand and backhand technical skills test based on biomechanical indicators and shot accuracy. The technique assessment referred to the components of stance, grip, backswing, contact point, follow-through, and ball direction accuracy, as recommended in the table tennis technique analysis literature (Iino & Kojima, 2016; Malagoli-Lanzoni et al., 2021; Zhang et al., 2019). Two physical education experts and one certified table tennis coach consulted for the instrument's content validity. Inter-rater reliability was tested using the Intraclass Correlation Coefficient (ICC), as recommended in sports performance evaluation research (Hopkins, 2017; Rossi et al., 2022).

Data collection procedures were conducted through practical tests. Each student was given 10 forehand and 10 backhand shots toward designated target areas on the table. Scores were awarded based on technical quality and accuracy of ball direction. The target-based skills testing approach has been shown to be effective in measuring shot consistency and control in novice players (Fuchs et al., 2018; Lidor & Ziv, 2019).

Data analysis was conducted quantitatively and descriptively by calculating the mean, standard deviation, category percentage, and skill coefficient. Ability category classification was determined based on the standardized scoring intervals (excellent, good, fair, poor), as applied in school sports skills evaluation research (Ahmad Junaidi et al., 2024; Hafiza & Hafidz, 2018).

This approach allows for a comprehensive interpretation of students' level of mastery of basic techniques, which serves as the basis for planning evidence-based physical education interventions (Bailey et al., 2018; Kondric et al., 2020).

Table 1.
Forehand and Backhand Technique Assessment Instrument Layout

No	Technical Components	Assessment Indicators	Score 1–5	Conceptual References
1	Stance (Starting Stance)	Foot position, balance, and body readiness	1–5	Iino & Kojima (2016)
2	Grip	Bat grip position according to the shakehand technique	1–5	Zhang et al. (2019)
3	Backswing	Coordination of the initial arm swing and trunk rotation	1–5	Malagoli Lanzoni et al. (2021)
4	Contact Point	Accurate timing and position of ball contact	1–5	Fuchs et al. (2018)
5	Follow Through	Continuation of movement and control of shot direction	1–5	Rossi et al. (2022)
6	Target Accuracy	Ball enters the target area	1–5	Kondric et al. (2020)

RESULTS AND DISCUSSION

Result

Analysis of Basic Forehand Stroke Skills

The results of a descriptive analysis of 15 male students at SMK Negeri 1 Poso Pesisir show that their basic forehand stroke skills had a mean of 50, a median of 47, and a standard deviation of 10. These values indicate moderate variation in skill among students,

with a relatively homogeneous distribution of data. Conceptually, the forehand is the dominant technique in table tennis because it involves more explosive trunk rotation and shoulder-arm coordination than the backhand (Iino & Kojima, 2016; Malagoli Lanzoni et al., 2021). The distribution of forehand stroke skills is presented in Table below:

Table 2.
Distribution of Forehand Stroke Skills

Category	Frequency	Percentage (%)
Very High	0	0%
High	8	53%
Medium	4	27%
Low	0	0%
Very Low	3	20%
Total	**15**	**100%**

The majority of students (53%) were in the high category, indicating a fairly good mastery of technique in terms of stance, timing, and accuracy. This finding aligns with research by Zhang et al. (2019) and Fuchs et al. (2018), which stated that beginners master the forehand more quickly because its movement pattern is more natural and dominant. However, 20% of students were still in the very low category, indicating weak coordination and ball control, as explained in the study by Kondric et al. (2020), which found that shot accuracy is heavily influenced by postural stability and footwork.

The absence of students in the very high category indicates a lack of optimal technique mastery. This reinforces the argument by Lidor & Ziv (2019) that developing basic technique at the school level requires systematic practice and structured feedback.

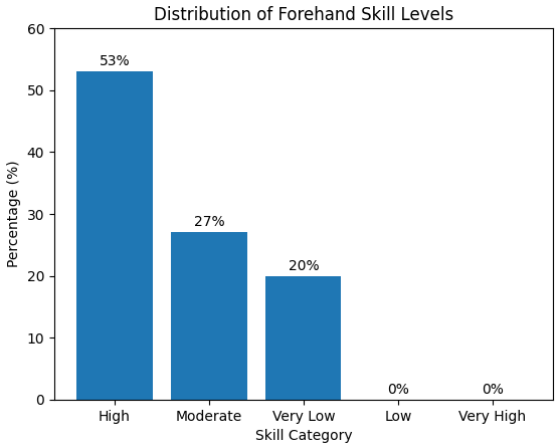

Figure 1.
Bar Chart of Forehand Ability

Analysis of Basic Backhand Technique Ability

The descriptive results of basic backhand technique ability show a mean of 50, median of 52, and standard deviation of 10. The slightly higher median indicates that some students with lower scores are influencing the average. Biomechanically, the backhand requires more precise forearm control and shoulder stability, making it generally more difficult for beginners (Iino & Kojima, 2016; Rossi et al., 2022). The distribution of backhand ability is presented in Table below:

Table 3.
Distribution of Backhand Ability

Category	Frequency	Percentage (%)
Very High	0	0%
High	5	33%
Medium	4	27%
Low	6	40%
Very Low	0	0%
Total	**15**	**100%**

The majority of students (40%) were in the low category, indicating that their backhand technique has not yet developed optimally. This finding is consistent with research by Malagoli Lanzoni et al. (2021), which stated that the backhand requires more complex neuromuscular control than the forehand. Thirty-three percent of students were in the high category and 27% in the medium category, indicating a wider variation in ability compared to the forehand.

There were no students in the very low or very high categories. This distribution indicates that, although there are no extreme performance levels yet, most students still require intensive improvement in timing and ball control. Studies by Harvey & Jarrett (2016) and Otte et al. (2020) emphasize that a game-based learning approach and structured technique repetition are effective in improving backhand consistency at the school level.

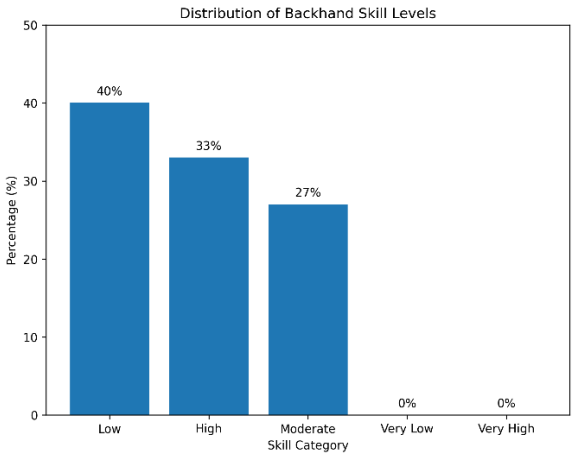

Figure 2.
Backhand Ability Bar Chart

Comparatively, forehand performance is superior to backhand performance. This aligns with biomechanical literature, which explains that the forehand utilizes greater trunk rotation, resulting in greater control and power stability (Iino & Kojima, 2016; Zhang et al., 2019). Meanwhile, the backhand relies more on wrist control and shoulder stability, which are still developing in beginner players (Rossi et al., 2022).

These results indicate the need for differentiated learning strategies with an emphasis on progressive backhand technique training, including coordination drills and target-based accuracy training (Fuchs et al., 2018; Lidor & Ziv, 2019).

Discussion

The results of the study indicate that the basic forehand stroke proficiency of students at SMK Negeri 1 Poso Pesisir is generally in the high category (53%), with an average score of 50 and a standard deviation of 10. Conversely, basic backhand stroke proficiency is still predominantly in the low category (40%), although 33% of students are in the high category. This difference indicates an imbalance in basic technique mastery, which can be conceptually explained through the perspectives of biomechanics, sports pedagogy, and motor learning theory.

Theoretically, forehand and backhand technique mastery is significantly influenced by the frequency and quality of practice. The principle of repetition-based learning in motor learning theory states that motor skills will improve through structured practice and consistent feedback (Schmidt & Lee, 2019; Magill & Anderson, 2017). Research by Lidor & Ziv (2019) confirms that at the beginner and school levels, the frequency of basic technique practice significantly contributes to improving stroke consistency. Thus, the dominance of the high category forehand can be assumed to be the result of more frequent practice, given that the forehand is the most commonly taught and used stroke in the game. From a biomechanical perspective, the forehand has an advantage because it involves greater trunk rotation, activation of the dominant shoulder muscles, and the contribution of floor reaction forces through kinetic energy transfer (Iino & Kojima, 2016; Malagoli Lanzoni et al., 2021). This movement pattern is naturally more powerful and stable than the backhand, especially in beginners. A study by Zhang et al. (2019) showed that the forehand drive produces higher ball speeds due to optimal shoulder and hip rotation. This explains why most students in this study were able to achieve high categories on the forehand. Conversely, the backhand technique demands more precise neuromuscular control with a relatively shorter range of motion and forearm and wrist dominance (Rossi et al., 2022). The backhand requires greater postural stability and precise intra-limb coordination. Fuchs et al. (2018) emphasized that novice players tend to struggle with the backhand due to limited eye-hand coordination and contact timing. The findings of this study, where 40% of students fell into the low category, align with those findings.

In addition to biomechanical factors, eye-hand coordination plays a crucial role in shot success. Mahendra (2019) emphasized that players with good visual-motor coordination are better able to determine distance, contact timing, and ball direction precisely. Recent literature shows that visual-motor coordination training improves table tennis shot accuracy by up to 18% over an eight-week intervention period (Kondric et al., 2020; Otte et al., 2020). Therefore, the low backhand ability of some students may be attributed to suboptimal specific coordination training. From a sports pedagogical perspective, the learning approach used also influences technical achievement. Harvey & Jarrett (2016) and Bailey et al. (2018) stated that game-based learning and the Teaching Games for Understanding (TGfU) approach can improve student participation and tactical understanding. However, basic techniques still require structured technical drills before being applied in game situations. If learning is more game-oriented without reinforcing basic techniques, more complex skills like the backhand tend to develop more slowly.

In the context of this study, the distribution of skills indicates that although there were no students in the very low or very high categories for backhand, the proportion in the low category was quite dominant. This indicates that students have not yet reached the automatic stage of movement in the Fitts & Posner (1967) motor learning model, which is still relevant in modern literature (Schmidt & Lee, 2019). They are likely still in the cognitive or associative stage, where movements still require conscious control and are not yet consistent. Meanwhile, the predominant use of the forehand in matches provides more frequent practice opportunities, thus accelerating the neuromuscular adaptation process. Malagoli Lanzoni et al. (2021) explained that the dominant use of the forehand in rally play leads to faster development of this technique than the backhand. This finding is consistent with the results of a study that found 53% of students in the high category forehand.

Empirically, research by Ahmad Junaidi et al. (2024) at the secondary school level showed that students with a structured training program experienced significant improvements in basic techniques, particularly the forehand. Hafiza & Hafidz (2018) also found that systematic, instrument-based technique evaluations helped teachers identify students' specific weaknesses. In this study, survey data provided a clear indication that backhand technique development needs to be prioritized. The practical implication of these findings is the need for a differentiated learning strategy, emphasizing progressive training in backhand technique through: (1) Target-based hand-eye coordination drills; (2) Shoulder stability and wrist control exercises; and (3) Integration of simple footwork to support optimal body position.

A structured repetition-based training approach and visual feedback (video feedback) have been shown to improve technique accuracy by up to 20% in novice players (Rossi et al., 2022; Zhang et al., 2019). Overall, the results of this study indicate that students' forehand technique is considered good, while backhand technique still requires more intensive training. This disparity can be explained by differences in biomechanical complexity, frequency of use in play, and the level of coordination required. These findings reinforce the literature that mastery of basic techniques is the primary foundation for developing table tennis skills at the school level (Lidor & Ziv, 2019; Kondric et al., 2020). Therefore, a survey of basic technique skills, such as the one conducted in this study, is a strategic step in designing evidence-based instruction programs. The empirical data obtained not only describes the actual conditions of students but also provides pedagogical policy direction to improve the quality of table tennis instruction in schools.

CONCLUSION

Based on the results of a descriptive analysis of 15 male students at SMK Negeri 1 Poso Pesisir, the mean score for basic forehand stroke skills was 50, with a median of 47, and a standard deviation of 10. The distribution of categories showed that 53% of students were in the high category, 27% in the medium category, and 20% in the very low category, with no students in the very high or low category. This finding indicates that, in general, students' forehand skills are considered good, although they have not yet reached optimal mastery.

Conversely, basic backhand stroke skills had a mean of 50, a median of 52, and a standard deviation of 10, with a distribution of 40% in the low category, 27% in the medium category, and 33% in the high category. There were no students in the very low or very high category. The dominance of the low category for the backhand suggests that this technique still requires more intensive training than the forehand.

Conceptually, this difference reflects the greater biomechanical complexity and neuromuscular coordination of the backhand compared to the forehand. Thus, there is a gap in ability between the two techniques, so that special learning and training strategies are needed to improve the quality of backhand strokes systematically and continuously.

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We hope that the results of this study will make a tangible contribution to the development of data driven table tennis learning and improve the quality of physical education in schools.

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