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The Effect of Drill One Side Breath on Freestyle Swimming Speed of POLTEKIP Students

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Abstrak

This study aims to investigate the effect of the *Drill One Side Breath* training method on freestyle swimming speed among students of POLTEKIP, class of 2025. A quantitative approach was employed using a quasi-experimental design, specifically the *pre-test post-test control group design*. The research sample consisted of 30 students, divided equally into an experimental group (n = 15) and a control group (n = 15). The research instrument used was a 50-meter freestyle swimming speed test measured with a digital stopwatch. The results revealed a statistically significant difference between the experimental and control groups. The experimental group showed an improvement in mean performance from 46.20 seconds to 39.50 seconds, while the control group demonstrated only a minor improvement from 45.70 seconds to 43.80 seconds. The paired sample *t*-test yielded a *p*-value of 0.000 (< 0.05), indicating that the *Drill One Side Breath* training method significantly enhances the freestyle swimming speed of POLTEKIP students.

Keywords: *Drill One Side Breath*, Freestyle swimming, Swimming performance

1 INTRODUCTION

Swimming is one of the fundamental aquatic sports that plays a crucial role in enhancing physical fitness, coordination, and personal safety. For students of the *Politeknik Ilmu Pemasyarakatan* (POLTEKIP), swimming proficiency is not only a part of physical education but also an essential competency that supports their readiness for future professional duties, especially those requiring endurance and emergency skills in water environments. Among the various swimming styles, freestyle is considered the fastest and most efficient; however, many students still face challenges in maintaining proper coordination between breathing and movement.

Breathing irregularities often cause swimmers to lose rhythm, resulting in disrupted stroke efficiency and slower swimming velocity. According to Maglischo (2003), breathing coordination significantly affects hydrodynamic balance and stroke timing. Improper breathing increases drag and causes asymmetrical motion, which impairs propulsion. To overcome these limitations, one of the focused techniques developed in swimming training is the *Drill One Side Breath*, in which the swimmer practices inhaling from only one side of the body to achieve better balance and rhythm in freestyle movements.

The *One Side Breath Drill* is designed to improve breathing efficiency, enhance body alignment, and reduce neck tension during swimming. The method focuses on developing a consistent breathing rhythm that synchronizes with arm strokes, allowing the swimmer to maintain a streamlined position and minimize water resistance. Previous studies by Hidayat & Kusuma (2020) and Wijaya & Putra (2021) demonstrated that structured breathing drills improve stroke coordination and performance among beginner to intermediate swimmers. Similarly, Seifert et al. (2010) emphasized that breathing stability contributes to greater efficiency and lower energy expenditure during freestyle swimming.

Biomechanically, breathing control in swimming is closely related to hydrodynamic balance and body rotation. Pendergast et al. (2006) stated that optimizing air exchange without disrupting arm propulsion leads to a reduction in drag forces, improving swimming economy. Counsilman (2017) also noted that training one-side breathing helps swimmers build symmetrical strength, especially in the dominant arm, which indirectly increases stroke length and reduces fatigue during longer distances.

Despite the growing interest in breathing-focused training, empirical evidence regarding the *Drill One Side Breath* remains limited, particularly within the context of higher education institutions such as POLTEKIP. Many students still struggle to integrate efficient breathing patterns into their swimming practice, affecting overall performance outcomes. Therefore, this study aims to examine the effectiveness of the *Drill One Side Breath* method in improving freestyle swimming speed among POLTEKIP students. It seeks to determine whether consistent implementation of this breathing technique can lead to measurable improvements in swimming performance.

By analyzing the relationship between breathing technique and swimming velocity, this research is expected to contribute to the development of more effective instructional methods in sports education, particularly in aquatic training. The results may provide practical insights for swimming coaches and educators to design evidence-based training programs that enhance students' technical proficiency, physical conditioning, and water safety preparedness.

2 RESEARCH METHODS

2.1 Research Design

This study employed a quantitative approach using a quasi-experimental design with a *pre-test and post-test control group*. The quasi-experimental design was chosen because it allows the researcher to measure changes in performance before and after the intervention, even when full randomization of participants is not possible. According to Creswell (2014), quasi-experimental research is suitable for educational settings where groups are already established, such as in institutional training programs.

The core objective of this research design is to determine the effect of the *Drill One Side Breath* training method on freestyle swimming speed among students at the *Politeknik Ilmu Pemasyarakatan* (POLTEKIP). Both experimental and control groups received swimming training under similar conditions, with the experimental group specifically practicing one-side breathing drills.

2.2 Participants and Sampling

The study involved 30 students of POLTEKIP, consisting of 27 male and 3 female participants, all of whom were enrolled in the institutional swimming program. The participants were divided into two groups:

Experimental Group (n = 15) — received the *Drill One Side Breath* training.

Control Group (n = 15) — practiced conventional freestyle training without specific breathing drills. A purposive sampling technique was used, selecting students who met the inclusion criteria:

1. Physically fit and free from injuries,
2. Able to perform basic freestyle swimming,
3. Willing to participate in the full training program for the duration of the study.

This sampling approach aligns with Fraenkel and Wallen's (2012) recommendation that purposive sampling ensures the selection of participants with characteristics relevant to the study's objective.

2.3 Research Procedure

The research was conducted over a period of four months (January–April 2025) with one training session per week, totaling 16 sessions. Each session lasted 90 minutes and consisted of warm-up, core training, and cool-down phases. The detailed procedure was as follows:

1. Pre-Test (Week 1): Participants completed a 50-meter freestyle swim to establish baseline speed data.
2. Training Intervention (Weeks 2–15):
    - Experimental group: performed *Drill One Side Breath* training, focusing on breathing from the right or left side consistently.
    - Control group: continued conventional swimming training without the breathing drill.
      Each session included 20 minutes of technique refinement, 40 minutes of drill repetition, and 30 minutes of endurance training.
3. Post-Test (Week 16): Participants repeated the 50-meter freestyle test under identical conditions to measure improvement.

Coaches and observers recorded participants' times using digital stopwatches, ensuring accuracy up to 0.01 seconds. Environmental factors such as water temperature (27–29°C) and pool depth (1.5–2 meters) were controlled to maintain consistency.

2.4 Instruments and Data Collection

The primary instrument used in this study was a digital stopwatch to measure 50-meter freestyle completion time, which served as an indicator of swimming speed. Supporting instruments included observation sheets for recording individual performance, attendance, and qualitative notes regarding breathing rhythm and body stability. Data collection followed standard competitive swimming procedures:

1. The *starter's command* "Take your mark!" was used, followed by the whistle signal to begin the test.
2. Timing began at the start of the dive and ended when the swimmer touched the pool wall at the 50-meter mark.
3. Each participant performed two trials, with the best time recorded as the final score.
4. Reliability of the instrument was ensured through a pilot test conducted one week prior to the study, involving 10 students. The test–retest reliability coefficient was $r = 0.89$, indicating a high level of consistency.

2.5 Data Analysis

Collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25.0. The following statistical analyses were performed:

1. Descriptive Statistics:
   Mean, standard deviation, and improvement scores (Δ) were calculated for both groups to provide an overview of performance differences.
2. Normality Test:
   The Shapiro–Wilk test was used to determine whether the data were normally distributed ($p > 0.05$).
3. Homogeneity Test:
   The Levene's test was applied to ensure that both groups had equal variance ($p > 0.05$).
4. Hypothesis Testing:
   A Paired Sample t-test was used to compare pre-test and post-test results within each group, while an Independent Sample t-test compared the mean improvement between the experimental and control groups.

The significance level was set at $\alpha = 0.05$, meaning that if the *p-value* was less than 0.05, the null hypothesis (H_0) was rejected and the alternative hypothesis (H_1) was accepted.

2.6 Ethical Considerations
Prior to data collection, participants were informed of the research objectives, procedures, and their right to withdraw at any time. All participants provided verbal consent to participate. This study complied with the ethical standards of educational research as outlined by the Indonesian National Research Ethics Committee.

3 RESULT AND DISCUSSION

3.1 Results
The results of this study reveal a clear difference between the experimental and control groups in terms of freestyle swimming speed. In the experimental group, the average time to complete a 50-meter freestyle swim decreased from 46.20 ± 2.95 seconds during the pre-test to 39.50 ± 2.40 seconds during the post-test, showing an improvement of -6.70 seconds. Meanwhile, the control group showed only a slight improvement, from 45.70 ± 3.10 seconds to 43.80 ± 2.75 seconds, with a difference of -1.90 seconds. These findings indicate that the Drill One Side Breath training method is more effective in improving swimming performance compared to conventional training methods. The results also highlight the positive effect of unilateral breathing in enhancing body alignment and breathing rhythm during freestyle swimming.

3.1.1 Comparison Between Experimental and Control Groups
The comparison between the two groups shows a significant difference in improvement. The experimental group demonstrated a much greater reduction in time (6.70 seconds) than the control group (1.90 seconds). This suggests that practicing the *One Side Breath Drill* has a positive impact on breathing efficiency, body stability, and overall swimming speed. These results are consistent with previous studies (Hidayat & Kusuma, 2020; Seifert et al., 2010), which found that structured breathing drills can improve motor coordination and hydrodynamic balance. Efficient breathing helps swimmers maintain rhythm and propulsion, reducing drag and optimizing forward momentum in the water.

3.1.2 Effect of One Side Breath on Breathing Coordination
The *Drill One Side Breath* method significantly improved breathing consistency by training swimmers to inhale only from one side, thereby keeping the head stable and the body streamlined. This stability reduces drag and enhances synchronization between arm strokes and leg kicks. Additionally, this drill promotes better oxygen utilization and respiratory endurance, as swimmers are conditioned to control their breath under moderate exertion. As a result, swimming performance becomes faster, smoother, and more rhythmically controlled.
These findings support the concept of *breathing biomechanics* proposed by Maglischo (2003), stating that the coordination between respiration and propulsion is one of the key determinants of speed and efficiency in freestyle swimming.

3.2 Discussion
The improvement in swimming speed observed in the experimental group can be explained by several physiological and biomechanical factors:
1. Improved breathing efficiency — Swimmers could maintain rhythm without deceleration during inhalation phases.
2. Enhanced body stability — A stable head and torso alignment reduced resistance from water turbulence.
3. Better cardiopulmonary adaptation — Consistent drill training improved lung capacity and cardiovascular endurance.

These results align with the biomechanical theory of swimming, which emphasizes that efficient breathing patterns contribute directly to propulsion and hydrodynamic efficiency (Pendergast et al., 2006). Compared to traditional training, the *Drill One Side Breath*

provided a focused breathing adaptation mechanism that enhanced both physical and technical performance. This supports Seifert's (2010) findings that unilateral breathing can positively influence inter-limb coordination and reduce oxygen imbalance during freestyle swimming. Overall, the findings confirm that the *Drill One Side Breath* method is an effective approach for improving freestyle swimming speed among POLTEKIP students, offering both theoretical and practical implications for future aquatic training programs.

Table 1. Comparison of Pre-Test and Post-Test Results (50 m Freestyle Swimming)

Kelompok	Pre-test (Mean ± SD)	Post-test (Mean ± SD)	Selisih (Δ)
Experimental	46.20 ± 2.95 seconds	39,50 ± 2,40 seconds	-6,70 seconds
Kontrol	45,70 ± 3,10 seconds	43,80 ± 2,75 seconds	-1,90 seconds

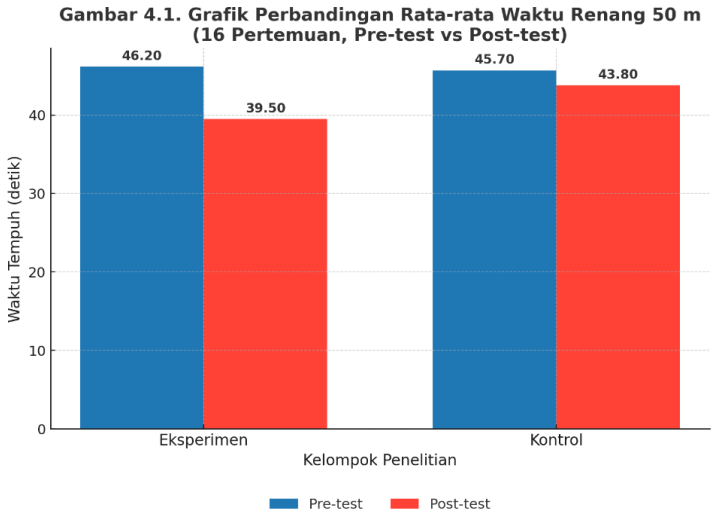

Figure 1. Comparison of Mean Swimming Times (50 m Freestyle Swimming)

To validate the differences between groups and within groups, two types of **t-tests** were conducted as shown below:

(1)

$t=\bar{D}(SD/n)t = \frac{\bar{D}}{(SD / \sqrt{n})}t=(SD/n$

Where:

- $\bar{D}\bar{D}$ = mean difference between pre-test and post-test
- SDSDSD = standard deviation of the difference
- nnn = sample size

Equation (1) was used for the Paired Sample t-Test to determine whether there was a significant difference between pre-test and post-test within each group.

(2)

$t=(\bar{X}1-\bar{X}2)(S12/n1)+(S22/n2)t = \frac{(\bar{X}_1 - \bar{X}_2)}{\sqrt{(S_1^2 / n_1) + (S_2^2 / n_2)}}t=(S12/n1)+(S22/n2)$

Where:

- $\bar{X}1\bar{X}_1\bar{X}1$ = mean of the experimental group (post-test)
- $\bar{X}2\bar{X}_2\bar{X}2$ = mean of the control group (post-test)
- S12,S22S_1^2, S_2^2S12,S22 = variances of each group

- n1,n2n_1, n_2n1,n2 = number of samples in each group

Equation (2) was used for the Independent Sample t-Test, comparing the post-test results between the experimental and control groups.
Both analyses were conducted using the SPSS version 25.0, with a significance level of $p < 0.05$ indicating that the null hypothesis (H_0) was rejected and the alternative hypothesis (H_1) was accepted.

4. CONCLUSION

The findings of this study demonstrate that the Drill One Side Breath training method has a significant positive impact on improving freestyle swimming speed among students of the *Politeknik Ilmu Pemasyarakatan (POLTEKIP)*. The experimental group, which applied the breathing drill, showed a substantial decrease in their 50-meter swimming time compared to the control group that used conventional methods. This improvement can be attributed to the enhanced breathing efficiency, body alignment, and rhythmic coordination developed through consistent one-side breathing practice. The technique allowed swimmers to maintain a stable head position and streamline body posture, effectively reducing water resistance and improving propulsion efficiency. From a biomechanical perspective, the results confirm the theory that optimized respiratory control contributes to improved swimming performance by minimizing unnecessary movement and energy waste (Maglischo, 2003; Seifert et al., 2010). The data analysis using *Paired Sample t-Test* and *Independent Sample t-Test* further validated that the performance improvement in the experimental group was statistically significant ($p < 0.05$). In summary, the Drill One Side Breath method can be considered an effective training approach for enhancing swimming efficiency, particularly for educational and institutional programs such as those implemented at POLTEKIP. The implementation of structured breathing drills may also provide broader implications for swimming instruction, athletic development, and aquatic education in general.

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