JUMORA: JURNAL MODERASI OLAHRAGA
E-ISSN: 2797-8761
Volume 5, No. 2, December 2025
DOI: 10.53863/mor.v5i2.1734
Universitas Ma'arif Nahdlatul Ulama Kebumen

Original Article Research

Front Crawl Technique of Rookie Swimmers Using the Front Crawl Technique Assessment

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Received: 26/06/2025 *Revised: 21/07/2025* *Accepted: 22/07/2025*

Abstract

This study aims to analyze the most frequent freestyle swimming technique errors among elementary school rookie swimmers and examine how these errors affect swimming performance. A qualitative case study approach was used, utilizing the *Front Crawl Technique Assessment* instrument. The participants were 26 rookie swimmers who completed a 50-meter swim test, during which their technique errors and completion times were analyzed. The most frequent errors included *kicking too deep*, *underreaching during entry*, and *lifting the head forward during inhalation*. Pearson's correlation analysis revealed a strong positive relationship between the number of technical errors and swim completion time ($r = 0.95$ for males; $r = 0.93$ for females, $p < 0.01$). This indicates that higher error rates were associated with slower swim times. These findings underscore the critical importance of technical precision in swimming performance and highlight the value of an objective assessment tool for evaluating and improving technique in young rookie swimmers. These results provide valuable guidance for coaches to design developmentally appropriate and targeted training programs that address specific technical weaknesses in rookie swimmers. Future researchers can build on these findings by testing whether targeted technique-correction programs accelerate skill acquisition in other swimming strokes or age groups.

Keywords: Freestyle Swimming Technique, Front Crawl Technique Assessment, Rookie Swimmers, Technique Evaluation, Movement Coordination.

How to cite:

Azhar, M., Carsiwan, C., Nugraha, R., & Gumilar, A. (2025). Front Crawl Technique of Rookie Swimmers Using the Front Crawl Technique Assessment. *Jurnal Moderasi Olahraga*, *5*(2), 233–244. https://doi.org/10.53863/mor.v5i2.1734

1. INTRODUCTION

Among various swimming styles, freestyle often becomes the primary focus in swimming technique education due to its efficiency and resulting speed (Tahapary et al., 2020). Freestyle

swimming also serves as a foundation in swim instruction, especially for rookie swimmers (Marques & Corrêa, 2016). However, to achieve optimal performance, mastering basic techniques is essential, including arm movement (stroking), leg kicks (kicking), and synchronized breathing coordination (Arhesa & Ma'mum, 2023; dos Santos et al., 2021). Arm movements or stroking function as the main propulsion force (Takagi et al., 2023), while leg kicking serves to maintain body balance and increase swimming speed (Claus et al., 2017). In addition, breathing coordination is crucial to maintaining smooth movement rhythm, requiring swimmers to breathe with appropriate timing to avoid disrupting body position (Ribeiro et al., 2017). For rookie swimmers, especially elementary school-aged children, learning these techniques often presents unique challenges. Children are typically still in the motor development stage, and their ability to coordinate body movements synchronously is often underdeveloped (Febrianta, 2016; Nur'aeni et al., 2023). Limitations in motor control and coordination due to factors such as muscle strength, body position awareness, and understanding of underwater breathing pose challenges and barriers to learning swimming techniques (Arhesa et al., 2020; Yuliana et al., 2021). Common technical errors include misaligned body position, such as the head held too high or the body leaning downward, as well as irregular or low-amplitude leg kicks (Rodríguez et al., 2016; Washino et al., 2021).

Swimming coaches play a crucial role in helping rookie swimmers overcome these challenges. In practice, technique assessment is often conducted subjectively, relying on direct observation or coach experience (Can et al., 2021). Although this approach is common, subjectivity in assessment can hinder the delivery of measurable and consistent feedback (Novia Rozalini et al., 2020). Additionally, without a clear evaluation framework, coaches may struggle to identify the specific technical errors most affecting swimmer performance (Mardinus & Maidarman, 2019). These rookie swimmer errors not only reduce movement efficiency but also risk forming bad habits that are difficult to correct if left unaddressed. Thus, improving the method of technique evaluation becomes increasingly important, particularly with early identification of errors, so that the learning process becomes more effective and targeted by correcting their movements and establishing a solid technical foundation.

Children learning freestyle swimming techniques also face additional pressure from the need to integrate body movements with breathing in water (Nugraha et al., 2024). Coordination between the arms, legs, and breathing is often the greatest challenge, especially for children without prior swimming experience (Denay et al., 2022; Selis & Dermawan, 2022). Without a systematic instructional approach, unidentified technical errors may lead to bad habits that are hard to break later. This not only hampers technical development but can also affect a child's confidence in swimming. Instructional strategies for rookie swimmers must be tailored to their needs, using simple yet effective methods. Providing specific and immediate feedback allows athletes to understand their mistakes and how to correct them (Kretschmann, 2017). Therefore, a more structured and objective evaluation approach is needed to help coaches accurately identify technical errors (Widianingsih & Suklani, 2024), so the learning process can be adapted to the specific needs of children as rookie swimmers.

The purpose of this study is to identify and analyze the most common freestyle swimming technique errors among elementary school rookie swimmers and their impact on swimming performance. Through assessment, coaches can identify errors in body position, arm and leg movements, as well as breathing coordination. These assessment results provide a basis for specific feedback to help swimmers correct their movements (Kapus et al., 2022). This study also

aims to explore how these errors can serve as the basis for designing more effective instructional methods. By understanding the patterns of technical errors, this research is expected to provide more measurable guidance for coaches in developing training programs suited to children's needs (Prasetryo et al., 2023). Furthermore, this study aims to contribute to the development of more objective swimming technique evaluations to support an optimal learning process for rookie swimmers (Atiq & Budiyanto, 2020). The findings are expected to enrich the literature in swimming sports while offering practical solutions for coaches in improving children's swimming technique quality.

2. METHOD

This study employs a qualitative approach with a descriptive method (Handayani, 2020). This approach was chosen because it allows the researcher to explore in depth the experiences, perceptions, and challenges faced by elementary-level rookie swimmers in learning freestyle techniques. Through a qualitative approach, this study also provides a comprehensive understanding of common technical error patterns and how these affect the swimming performance of rookie swimmers (Fadli, 2021).

The descriptive method is used to describe conditions and phenomena in detail, including the identification of technical errors such as body position, arm movement (stroking), leg movement (kicking), and breathing coordination. This study aims to generate empirical data that can be used by coaches to develop more effective instructional strategies and support the development of technical swimming skills among rookie swimmers (Kusmarni, 2012).

2.1 Participants

Descriptive survey research is an approach used to collect data related to current situations, habits, and trends, which are then critically analyzed, interpreted, and concluded to obtain a general overview of the findings. The participants in this study were elementary school rookie swimmers aged 9–12 years. They were rookie swimmers from a swimming club in Bandung, West Java, and a total of 26 participants agreed to take part in this study.

2.2 Research Design

This study uses a case study design to obtain an in-depth overview of freestyle swimming techniques in rookie swimmers (Assyakurrohim et al., 2022). This design allows the researcher to analyze phenomena occurring in a natural context (in this case, swimming training) and to understand the dynamics between rookie swimmers and coaches. The case study includes direct observation of rookie swimmers during training sessions as well as their coaches.

2.3 Instruments

In this study, the researcher used an instrument relevant to freestyle swimming, namely the Front Crawl Technique Assessment (Kapus et al., 2022), which focuses on evaluating freestyle technique errors. This tool highlights that errors such as misaligned body position and irregular kicking have a significant impact on swimmer performance, thus emphasizing the need for an objective evaluation tool.

2.4 Procedures

Several procedures were conducted to carry out this study, including participant selection, data collection, and data analysis. The rookie swimmers were required to swim 50 meters as

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quickly as possible from the starting block. Measurements were conducted with two swimmers swimming simultaneously. This test was held in a 50-meter swimming pool as deep as 150 cm, in a 24°c water temperature. Each swimmer's time was recorded and the technical errors made during the swim were analyzed.

2.5 Data Analysis

The recorded performance data of the swimmers were then processed. The technical analysis of this study was conducted using statistical analysis techniques with IBM SPSS Statistics version 31.0.0.0. The variables analyzed in this study were the 50-meter time record of each rookie swimmer and the number of technical errors committed.

3. RESULTS

Based on the results obtained from the analysis using IBM SPSS software, the most frequently observed technical errors among rookie swimmers in each group included: *too much hip rotation* and *hips are too deep*; *kicking too deep*; *underreaching during entry*; and *lifting the head forward during inhalation*. Each of these errors occurred in fewer than 50% of the participants.

Table 1.

Descriptive statistics of Front Crawl Technique Assessment

	r	Time (Mean)	SD
MALE	14	40.24	± 4.53
FEMALE	12	43.45	± 4.91

The data description based on Table 1 obtained from 14 male rookie swimmers and 12 female rookie swimmers. Based on the Table 1, the mean of time recorded by rookie swimmers is 40.24 with a standard deviation of ± 4.53 for male, and 43.45 with a standard deviation of ± 4.91 for the female.

Table 2.

Frequency distribution of Front Crawl Technique Assessment

MISTAKES	POINTS	MALES	FEMALES	PERCENTAGE
BODY POSITION				
Too much hip rotation	3	3	6	35%
Hips are too deep	3	4	5	35%
Not keeping the whole body in a straight line	4	2	2	15%
The head is too deep	2	0	1	4%

KICKING				
Kicking too deep	3	6	5	42%
Kicking is not rhytmical	2	5	4	35%
Feet not turned in	2	3	5	31%
Kick amplitude too large	3	3	5	31%
Kicking not continuous	3	4	4	31%
Dorsiflexing the feet	5	3	5	31%
Kicking too high	1	0	5	19%
Bicycle kicking	4	2	3	19%
Kicking from the knee	3	1	2	12%
Feet not extended	3	0	1	4%
ARMSTROKING				
Underreaching during entry	4	7	4	42%
Keeping fingers too wide apart	1	5	4	35%
Swing arm over the water low and wide	3	4	5	35%
Finishing the armstroke too early	4	3	5	31%
Entering the hand across the centre line	3	6	0	23%
Wrist drop during entry	4	1	5	23%
Insweep too short	3	1	4	19%
Wrist drop during stroke	3	0	3	12%
No hand acceleration during the pull	3	0	2	8%
Elbow drop during entry	5	0	1	4%
BREATHING AND COORDINATION				
Lifting the head forward during inhalation	4	7	4	42%
Pulling the head back and out of alignment	3	4	6	38%
Downsweep started too soon	4	4	5	35%
Holding the head unnaturally high	3	7	1	31%
Head up swimming	5	0	3	12%

Source: Primary Data

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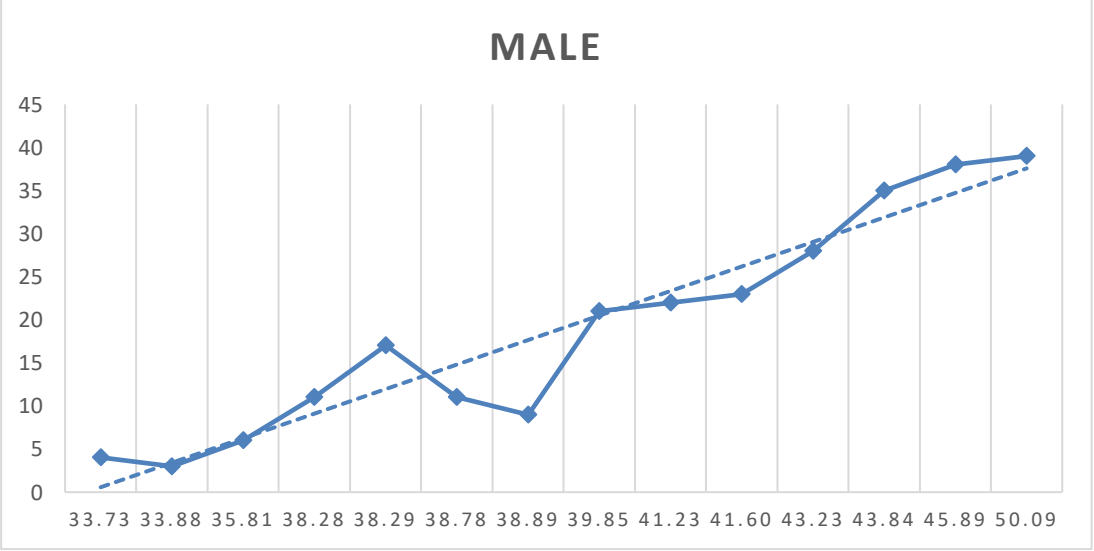
As shown in Table 2, a detailed breakdown of the frequency and types of technical errors revealed that male and female rookie swimmers exhibited several recurring faults in key areas of freestyle technique, including body position, kicking, arm stroking, and breathing coordination. These mistakes were quantified and categorized, providing a comprehensive profile of each swimmer's technique performance. When these error scores were compared with the 50-meter freestyle swim time, a clear pattern emerged. The average swim completion time was 40.24 ± 4.53 seconds for male participants and 43.45 ± for female participants. A Pearson's correlation analysis was conducted to examine the relationship between the total number of technical errors committed and the swimmers' recorded completion times. The results indicated a very strong and statistically significant positive correlation between these two variables for both groups, $r(14) = 0.95, p < 0.01$ for male rookie swimmers and $r(12) = 0.93$, $p < 0.01$ for female swimmers, suggesting that the more technical mistakes a swimmer made, the longer their completion time tended to be.

This correlation reinforces the critical impact that technical proficiency has on performance outcomes. The data imply that swimmers who accumulated a higher number of errors, such as deep kicking, misaligned body positioning, and improper breathing mechanics, were more likely to experience performance inefficiencies that directly hindered their speed. Conversely swimmers with fewer recorded technical faults generally demonstrated better form and were able to complete the distance in shorter times. Therefore, the findings not only validate the use of structured technique assessments like the Front Crawl Technique Assessment but also emphasize the importance of targeted technical correction as a central component of training programs aimed at beginner swimmers.

Figure 1.

Correlation between the time achieved by male rookie swimmers and the number of technical errors made.



The data presented in Figure 1 illustrates the correlation between the total number of technical errors and the 50-meter freestyle swim time recorded by male rookie swimmers. The scatter plot shows a clear positive linear trend, indicating that as the number of technical errors increases, the swim time also tends to increase. This pattern confirms that male rookie swimmers

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who committed fewer technical errors achieved faster completion times, while those with a greater number of errors experienced performance delays.

Figure 2.

Correlation between the time achieved by female rookie swimmers and the number of technical errors made.

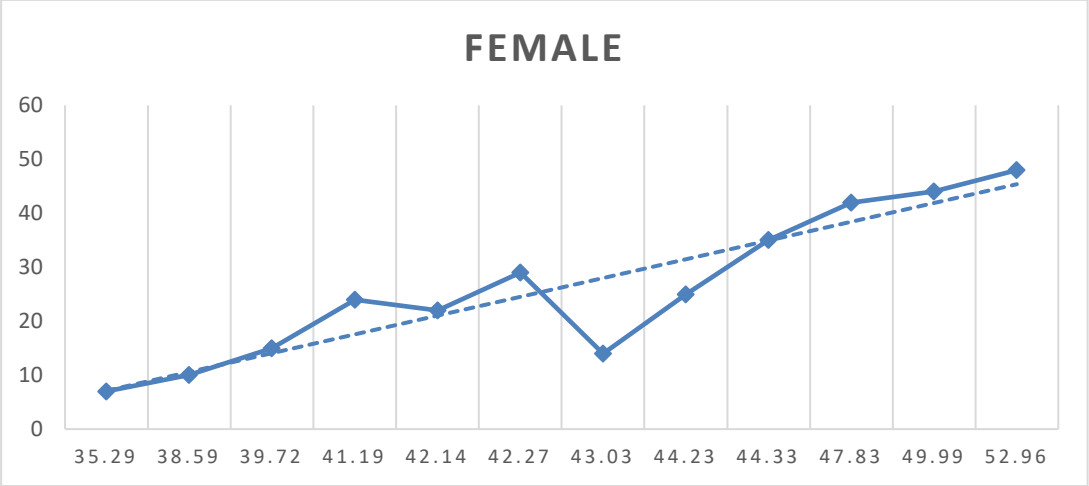

Figure 2 presents the relationship between technical error frequency and 50-meter swim completion time among female rookie swimmers. Similar to the male group, the plot displays a consistent positive linear relationship, where swimmers who made more technical errors tended to swim more slowly.

4. DISCUSSIONS

The study results indicate that several consistent technical errors occur among elementary school rookie swimmers during freestyle swimming. These include errors in posture, arm movement, leg movement, and breathing coordination. The most dominant findings were errors in kicking and breathing techniques, such as *kicking too deep*, *underreaching during entry*, and *lifting the head forward during inhalation*. This aligns with previous findings by (Arhesa & Ma'mum, 2023), who noted that imbalances in leg and breathing coordination pose significant challenges for rookies.

The results of Pearson's correlation analysis reveal a statistically significant and strong positive relationship between technical errors committed and the time taken to complete a 50-meter freestyle swim. This correlation was consistently observed across gender groups, with male rookie swimmers showing a correlation coefficient of $r = 0.95$ ($p < 0.01$) and female rookie swimmers $r = 0.93$ ($p < 0.01$), indicating that as the number of technical faults increases, the performance time also tends to rise. These results provide compelling evidence that technical proficiency plays a crucial role in determining swimming outcomes, particularly among rookie swimmers who are still developing fundamental motor skills. The high correlation coefficients suggest that technical faults such as improper kicking mechanics, misaligned body posture, and flawed breathing coordination can substantially reduce swimming efficiency, leading to increased drag and diminished propulsion (Febrianti et al., 2024).

This aligns with the findings of (Kapus et al., 2022), who emphasized that biomechanical

inefficiencies, especially those disrupting streamline positioning and the generation of propulsive force, are key factors that impair swim performance. Furthermore, the results underscore the importance of early identification and correction of these errors to enhance stroke economy and improve overall swimming speed. In this context, performance in freestyle swimming is not solely dependent on physical conditioning but is heavily influenced by the quality and synchronization of technical elements(Yeliz & Sunay, 2023). As such, regular technical assessments and targeted interventions should be a central component of training programs, particularly for children at the beginner stage, to ensure the development of sound and effective swimming techniques from an early age.

Frequent technical issues such as deep kicking and underreaching during arm entry strongly indicate that rookie swimmers often face challenges related to timing and control of propulsion. These particular errors suggest a lack of awareness or difficulty in coordination the propulsive phases of the stroke, which are essential for achieving forward momentum. When kicks are executed too deeply, they disrupt the swimmer's horizontal alignment in the water and generate unnecessary vertical motion rather than efficient forward propulsion. Similarly, underreaching in the arm entry phase compromises the length of the stroke, reducing stroke efficiency and power output. These deficiencies in movement patterns point to a broader issue of underdeveloped motor planning and execution that are typical in early-stage swimmers (Listyana, 2021).

Additionally, lifting the head forward during inhalation introduces a significant biomechanical disadvantage. This action disrupts the hydrodynamic body line, increases frontal drag, and causes a momentary loss of streamline, which collectively leads to a slower swimming pace (Ribeiro et al., 2017). This error also affects the rhythm of breathing and stroke timing, which can lead to fatigue and reduced endurance, especially during longer swim distances.

Beyond technical faults, the physical maturity and motor coordination of children in this developmental stage play a crucial role in their ability to perform complex aquatic movements. Most elementary-aged swimmers are still in the process of refining neuromuscular control, balance, and body awareness, which are critical components for executing swimming techniques effectively (Febrianta, 2016). Their motor skill acquisition is ongoing, and this can limit their capacity to synchronize movements across multiple body segments such as arms, legs, and breathing required for efficient freestyle swimming (Nur'aeni et al., 2023). Consequently, errors are not only common but expected at this stage of learning.

Given this developmental limitations, instructional strategies must be adapted accordingly. Coaches and educators should employ teaching methods that are developmentally appropriate, prioritizing clear demonstration, simplified technical breakdowns, and step-by-step progression of skills. Immediate and specific feedback is essential to help swimmers understand the nature of their mistakes and how to correct them effectively (Dinata et al., 2015). Moreover, creating a supportive learning environment that encourages practice and experimentation is vital for motor learning and confidence building among rookie swimmers.

To enhance the learning process, structured and objective evaluation instruments like the Front Crawl Technique Assessment (Kapus et al., 2022) provide significant advantages over traditional observational techniques. These tools enable coaches to systematically identify technical shortcomings, categorize them, and track quantifiable data helps ensure consistent feedback and allows for individualized instructional planning. This is especially important in early

training stages where movement patterns are still malleable. Correcting errors early prevents the development of faulty motor habits that are difficult and time-consuming to retrain at later stages of skill development (Widianingsih & Suklani, 2024). Therefore, integrating such assessment tools into regular training routine is critical for fostering long-term improvement and laying a strong technical foundation in young rookie swimmers.

5. CONCLUSIONS

This study concludes that elementary school rookie swimmers frequently exhibit technical deficiencies in their freestyle swimming, with the most prevalent errors observed in the form of deep kicking, underreaching during arm entry, and lifting the head forward during inhalation. These specific faults not only reflect the swimmers' lack of technical mastery but also significantly contribute to reduced movement efficiency and increased swim times. The strong positive correlation identified between the number of technical errors and the 50-meter freestyle completion time ($r = 0.95$ for males; $r = 0.93$ for females, $p < 0.01$) provides compelling evidence that technical performance is a critical determinant of swimming outcomes, even in the early stages of skill development.

These findings underscore the pressing need for a structured and objective evaluation approach in swimming instruction, particularly for novice swimmers who are still developing fundamental motor coordination. Rather than relying solely on observational assessments, coaches and educators should implement standardized tools—such as the Front Crawl Technique Assessment—to diagnose specific technical weaknesses and track improvements over time. By focusing on the integration of arm movement, leg kicking, and breathing coordination, instructional strategies can be tailored to the developmental needs of young swimmers, ensuring that proper habits are established early in their training process.

Furthermore, this research contributes to the existing body of knowledge by highlighting the measurable impact of technical accuracy on performance, and it provides practical implications for the design of targeted, age-appropriate swimming programs. In doing so, it advocates for the adoption of evidence-based coaching practices that prioritize technical correction as a foundation for long-term athlete development. Ultimately, the insights gained from this study aim to enhance the effectiveness of swim instruction for beginner-level athletes and support their progression toward higher levels of competence and confidence in the sport.

Acknowledgment

I would like to express my sincere gratitude to my beloved parents for their endless support and encouragement throughout this research. My deepest appreciation also goes to my academic supervisor for their invaluable guidance and insightful feedback. I am grateful to my friends and colleagues for their constant motivation and assistance during the writing process. Special thanks are extended to the Department of Physical Education, Health, and Recreation for providing the academic environment and support necessary for this study. Lastly, I would like to thank all the participants who willingly took part in this research; without their contribution, this study would not have been possible.

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