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Evaluation of Breaststroke Swimming Techniques (Body Position, Arm Movement, Leg Kick, and Breathing) for PJKR FIKK UNM Students in 2024

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Abstract. This study aims to evaluate breaststroke swimming techniques (body position, arm movement, leg kick, and breathing) in students of the Physical Education, Health, and Recreation (PJKR) Study Program, Faculty of Sport and Health Sciences (FIKK), Makassar State University in 2024. The method uses a descriptive quantitative design with video observation and direct assessment on 50 students in semesters 3-5 who have taken basic swimming courses. The assessment instrument includes a 0-10 scale for four technical components with an ICC reliability of 0.92, validated by three expert examiners. Data were collected through a 25-meter swim recorded by a high-speed camera (120 fps), analyzed with descriptive statistics, reliability tests, and one-way ANOVA. The results showed good body position (mean=7.8; SD=1.2), moderate-good arm movement (mean=7.2; SD=1.4), good leg kick (mean=7.6; SD=1.3), adequate breathing (mean=6.9; SD=1.5), with an overall average of 7.4 (74%) in the good category. Breathing was the weakest component because the timing was not synchronized with the arm-leg cycle. Male students were significantly superior in leg kick (p=0.012), while female students were better in breathing (p=0.045). Influencing factors included training frequency (r=0.68) and water experience (r=0.62). The study concluded that the breaststroke swimming technique of PJKR FIKK UNM students was at a good level overall, but required specific interventions in breathing and coordination to achieve competitive standards.

Keywords: breaststroke swimming, body position, arm movement, leg kick, breathing, PJKR students

1 Introduction

Breaststroke is one of the most fundamental swimming strokes taught in physical education programs at various universities because it is considered relatively easy for beginners to master and has high applicability in water safety (Rulianto, 2017). However, mastering breaststroke technique is not always easy for students. Mastering the four main technical components—body position, arm movement, leg kick, and breathing—requires high motor coordination and a

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thorough understanding of biomechanics. Research by Maglischo (2003) shows that breaststroke technique is one of the most complex strokes because it involves synchronizing rhythms and propulsion patterns that differ from other swimming strokes.

In the Physical Education, Health, and Recreation (PJKR) Study Program at Makassar State University, swimming is a compulsory course aimed at equipping students with basic skills and professional abilities as future educators. However, several internal academic reports and empirical experiences of instructors indicate that some students still experience difficulty coordinating breathing and leg kick techniques and are unable to maintain a streamlined body position. These findings are consistent with research by Nasution and Pratiwi (2020), which identified that PJKR students often experience difficulties with physiological aspects and motor coordination when learning the breaststroke.

This condition indicates that breaststroke technique challenges are not simply a matter of basic skills, but rather a broader learning issue related to the effectiveness of instruction and students' practice experiences. Therefore, a systematic evaluation of the quality of students' swimming technique is crucial to determine the extent to which learning outcomes have been achieved.

The urgency of this research lies in the institutional need to improve the quality of swimming instruction at UNM and ensure students achieve adequate swimming technique competency standards. As prospective PJOK teachers, students must possess strong demonstration and instructional skills in swimming; failure to master technique will impact the quality of their teaching at school. Sari et al. (2020) emphasized that poor breaststroke mastery can reduce students' confidence in teaching and hinder their ability to demonstrate correct technique.

Furthermore, advances in learning technology, such as video analysis, provide opportunities for more accurate and objective technique evaluation. This is important considering that many previous studies still use subjective observation methods that are potentially biased. Recent evaluations utilizing high-speed camera recordings have also been able to detect technical errors that are difficult to identify through direct observation (Thomas et al., 2020). Therefore, this research is important not only for improving student performance but also for updating swimming learning evaluation methods.

Research Gaps Several research gaps were found based on the literature review:

1. There is a lack of research comprehensively evaluating all four technical components simultaneously in PJKR students. Most previous studies have only assessed one or two technical components, for example, only the leg kick or only breathing (Mahyuddin, 2021; Siregar, 2023).
2. There is a lack of research based on high-speed video analysis in physical education students, even though this method offers high accuracy in identifying technical errors (Thomas et al., 2020).
3. There is a lack of studies providing gender comparisons of breaststroke technique in PJKR students in South Sulawesi, even though the exercise physiology literature shows significant differences between men and women in motor power (Haugen et al., 2014).
4. The local geographic and institutional context (UNM) is underrepresented in breaststroke research, so region-based data is needed for relevant curriculum development.

5. There has been no research linking swimming experience, frequency of practice, and self-efficacy to the quality of technique, even though motor learning theory emphasizes the importance of repeated practice and self-confidence (Fitts & Posner, 1967; Ericsson, 2004).These gaps underlie the need for this research to provide a more comprehensive understanding of the breaststroke swimming technique of PJKR FIKK UNM students.

In the study of swimming biomechanics, a streamlined body position is a key factor in reducing drag. Maglischo (2003) stated that the drag coefficient in breaststroke can be significantly reduced if the athlete maintains a stable horizontal position. Meanwhile, Colwin (2018) emphasized that arm movements contribute approximately 60–70% of the propulsive force, while leg kicks contribute 30–40%.

Fitts and Posner's (1967) motor learning theory explains that mastery of swimming technique occurs through three stages: cognitive, associative, and autonomous. Many swimming students are at the associative stage, where movement patterns have been formed but are not yet fully stable, resulting in frequent errors.

Furthermore, Ericsson's (2004) deliberate practice theory states that motor skills can only develop through purposeful and planned practice. This aligns with the strong relationship between practice frequency and improved swimming technique.

Previous research suggests that breaststroke technique mastery among physical education students varies. Mahyuddin (2021) found that swim club athletes achieved only 74.14% in the moderate category, with the leg kick being the weakest component. Siregar (2023) reported similar results, indicating that breathing was the most difficult component for prospective physical education students to master.

An international study by Swim-Teach (2007) indicated that asynchronous breathing timing was the primary cause of low breaststroke efficiency. Research by Patriot (2019) also confirmed that students frequently made errors in the catch and out-sweep phases of the arm movement. Meanwhile, Haugen et al. (2014) provided physiological evidence that differences in muscle strength between men and women can affect kick performance.

However, no study has yet combined all technical components simultaneously and conducted high-speed video-based analysis specifically on PJKR UNM students. Therefore, this study provides a novel contribution as a comprehensive, objective, and locally relevant evaluation of breaststroke technique.

2 Method

Research Design

Quantitative descriptive with video observation and expert panel assessment. Three test-retest sessions with 7-day intervals for reliability (Thomas et al., 2020).

Subjects/Participants

50 Physical Education (PJKR) FIKK UNM students in their third-fifth semesters (32 males, 18 females; age M=20.4 years; SD=1.2; swimming experience M=2.8 years; SD=1.1). Purpose: passed the basic swimming course, injury-free.

Research Instrument

Assessment Rubric (scale 0-10 per component):

Body Position: streamline, horizontality, head alignment.

Arm Movement: pull-out, catch, recovery.

Leg Kick: frog kick width, propulsion, timing.

Respiration: bilateral, low head lift, timing.

Total score: 40; categories: excellent ≥85%, good 70-84.9%, fair 50-69.9%. CVR validity = 0.94 (5 experts); ICC reliability = 0.92. Equipment: High-speed camera (120 fps), 25m FINA standard pool. Questionnaire: Training frequency, experience, self-efficacy ($\alpha = 0.87$).

Data Collection Procedure

Preparation: Informed consent, 15-minute warm-up, rubric familiarization.

Sessions 1-3: 25m breaststroke (3 repetitions), recorded from three angles (front, side, overhead). Simultaneous assessment by three examiners.

Conditions: Water temperature 27-28°C, morning.

Data Analysis Techniques

SPSS 27: descriptive (M, SD, % category); ICC reliability; independent t-test for gender; semester ANOVA; Pearson correlation factor ($\alpha = 0.05$).

3 Result

Sample Characteristics

Table 1. Demographics (N=50)

Variabel	f/%	M ± SD
Male	32 (64%)	-
Female	18 (36%)	-
Age (years)	-	20,4 ± 1,2
Swimming Experience (years)	-	2,8 ± 1,1

Variabel	f/%	M ± SD
Practice/Week	-	2,3 ± 0,8

Breaststroke Technique Score

Table 2. Results of Engineering Component Assessment

Component	M	SD	Category
Body Position	7,8	1,2	Good
Arm Movement	7,2	1,4	Pretty good
Leg Kick	7,6	1,3	Good
Breathing	6,9	1,5	Enough
Total	29,5	4,2	Good (74%)

ICC between examiners =0,92 ($p<0,001$).

Table 3. Distribution of Total Categories

Category	f	%
Very Good (≥34)	8	16
Good (28-33,9)	26	52
Enough (20-27,9)	16	32
Not enough (<20)	0	0

Group Differences

Table 4. Gender Comparison

Component	Male (32)	Female (18)	t (p)
Body Position	7,9±1,1	7,6±1,3	1,12 (0,268)
Arm Movement	7,4±1,3	6,9±1,5	1,45 (0,153)

Factor Correlation

Table 5. Correlation with Total Score

Factor	r	p
Exercise Frequency	0,68	<0,01
Water Experience	0,62	<0,01
Self-Efficacy	0,59	<0,01

4 Discussion

Breaststroke mastery (74%) was superior to Karimun (55.93%; Siregar, 2023) and Golden Black (74.14%; Mahyuddin, 2021), but similar to UNP FIK (Patriot, 2019). Strong body position (7.8) due to basic streamline training effectively reduces drag (Maglischo, 2003). Good leg kick (7.6) was in line with superior lower body strength in male students (p=0.012), consistent with gender physiology (Haugen et al., 2014). Weakest breathing (6.9) due to high head lift disrupting streamline, common in beginners (Colwin, 2018). The "pull-breathe-kick-glide" timing was out of sync (Swim-Teach, 2007), with women performing better (p=0.045) due to adaptation to breathing rhythm. Arm movement (7.2%) was adequate because the pull-out was too narrow and lacked propulsion.

The exercise correlation (r=0.68) supported deliberate practice (Ericsson, 2004). The semester gap was insignificant, indicating consistency in the UNM curriculum.

The findings of this study indicate that students' body position was in the good category (M=7.8), which is higher than several previous studies, such as Siregar's (2023) study, which only achieved a good score of 62%. These findings indicate that swimming instruction at the PJKR FIKK UNM has been able to emphasize the principle of streamlining, which contributes to reducing drag in the water. These results align with Maglischo (2003), who emphasized that horizontal body position is a dominant factor in swimming efficiency. The consistent good body position in this study also indicates that students have reached the associative phase of Fitts & Posner's (1967) Motor Learning Theory, particularly regarding the stability of movement patterns.

Arm movement received a score of 7.2 (fair-good), similar to the results of Mahyuddin's (2021) study of swimming club athletes, which recorded a score of 74.14%. However, this finding is lower than the Patriot (2019) study, which found that student swim coaches mastered arm technique better due to their familiarity with demonstrations. Insufficient arm opening (out-sweep) and a too-tight catch phase in this study reduced propulsion, preventing it from achieving the excellent category. This is consistent with Colwin (2018), who stated that a common mistake among beginners is a suboptimal pull angle, which reduces propulsion. This comparison confirms that mastery of arm movement still needs to be a focus of specific interventions.

Breathing was the lowest component in this study (M=6.9), indicating problems with timing and coordination of arm-leg movements. This condition was also found by Siregar (2023), who recorded only 58% in the adequate category for breathing. Excessive head lift in students leads to increased frontal drag, as explained by USMS (2025). Swim-Teach's (2007) study confirmed that the "pull–breathe–kick–glide" sequence was a primary cause of reduced breaststroke efficiency in beginners. Thus, this finding is consistent with previous research and confirms that breathing requires a structured, rhythm-based training approach.

The leg kick was in the good category (M=7.6) and showed a significant difference between men and women (p=0.012). These results support the theory of exercise physiology, which states that men generally have greater lower extremity muscle strength (Haugen et al., 2014). However, interestingly, research by Sari et al. (2020) showed that leg kick errors were the biggest factor in difficulty for PJKR students at several other universities. This difference may be due to the frequency of practice of UNM students, which in this study had a fairly strong correlation (r=0.68). Compared to the Bear Paddle study (2025), the frog kick pattern of the students in this study approached the propulsive standard, although there were still variations in kick width that affected stability.

The strong correlation between practice frequency (r=0.68) and swimming experience (r=0.62) on the total technique score reinforces the concept of deliberate practice from Ericsson (2004). Students who practiced more than twice per week tended to have better technique mastery across all components, including breathing, which is a common weakness. Furthermore, the lack of significant differences between semesters indicates that students have entered a relatively stable motor learning phase, but have not yet reached the fully autonomous phase. Previous research by Nasution & Pratiwi (2020) also identified that water experience significantly determines students' comfort in coordinating breaststroke swimming. Overall, the findings of this study confirm that improving training quality, using video analysis, and a gradual technique approach can accelerate student skill progress.

5 Conclusion

In addition to the main findings, which indicate that students' mastery of breaststroke technique is in the good category, this study also confirms that training frequency and swimming experience significantly influence technique quality. The more frequently students practice, the better their movement synchronization and breathing coordination. This supports the concept of deliberate practice, which states that motor skills develop through consistent and targeted practice.

The use of high-speed video analysis has proven effective in identifying technique errors that are not easily visible through direct observation. Integration of this technology into swimming instruction is recommended to improve the accuracy of evaluation and students' understanding of movement errors.

The study findings also revealed differences in performance based on gender, indicating the need for more differentiated learning strategies. Males tend to excel in leg kicks, while females excel in breathing rhythm. This understanding is important for lecturers to design exercises tailored to student characteristics.

Overall, this study provides an empirical basis for improving the curriculum and swimming instructional methods at UNM. Further research is recommended to explore other factors such as aerobic capacity, flexibility, and underwater technique analysis to enable a more comprehensive evaluation of swimming skills.

References

Colwin, C. M. (2018). Breakthrough swimming (2nd ed.). Human Kinetics.

Ericsson, K. A. (2004). Deliberate practice and the acquisition of expert performance. Academic Medicine, 79(10), S70-S81. https://doi.org/10.1097/00001888-200410001-00017

Fitts, P. M., & Posner, M. I. (1967). Human performance. Brooks/Cole.

Haugen, T., Tønnessen, E., Hisdal, J., & Seiler, S. (2014). The training and development of elite sprint performance. Sports Medicine, 44(6), 607-616. https://doi.org/10.1007/s40279-014-0173-8

Maglischo, E. W. (2003). Swimming fastest. Human Kinetics.

Mahyuddin. (2021). Analisis keterampilan teknik renang gaya dada atlet Golden Black Swimming Club. Jurnal Mahadewa, 1(1), 45-56.

Nasution, R., & Pratiwi, D. (2020). Identifikasi kesulitan belajar renang gaya dada mahasiswa PJKR S1 angkatan 2018. Jurnal Pendidikan Jasmani Indonesia, 15(1), 1-12. https://doi.org/10.21831/jpji.v15i1.31191

Patriot, A. (2019). Analysis of basic swimming chest style technique skills. Patriot Journal, 4(2), 1-10.

Rulianto, A. (2017). Teknik dasar renang. Penerbit XYZ.

Sari, D. P., et al. (2020). Identifikasi kesulitan belajar renang gaya dada. Garuda Kemdikbud. http://download.garuda.kemdikbud.go.id/article.php?article=1692366

Siregar, R. (2023). Analysis of breaststroke technique in PEHR students. Proceedings of ISET, 9(1), 235-240. https://proceeding.unnes.ac.id/ISET/article/view/2424

Swim-Teach. (2007). Basic breaststroke timing sequence for beginners. https://www.swim-teach.com/breaststroke-timing.html

Thomas, J. R., Nelson, J. K., & Silverman, S. J. (2020). Research methods in physical activity (7th ed.). Human Kinetics.

USMS. (2025). Breaststroke body position: The complete guide. https://www.usms.org/fitness-and-training/guides/breaststroke/body-position

Bear Paddle. (2025). Ultimate guide to the breaststroke. https://www.bearpaddle.com/swimming-blog/the-ultimate-guide-to-the-breaststroke/

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