

The Effectiveness of Breaststroke Training Using Slow Motion Video on Improving Basic Techniques of Physical Education Students at Pamulang University

Wendri Maryadi¹, Acep Rohmat Nurhidayat², Ilona Pratiwi Hutabarat³

¹Prodi Pendidikan Jasmani, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Pamulang

²Prodi Pendidikan Jasmani, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Pamulang

³Prodi Pendidikan Jasmani, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Pamulang

1dosen03055@unpam.ac.id, 2dosen02924@unpam.ac.id, 3dosen022923@unpam.ac.id,

Published: July, 2025

ABSTRACT

This study aims to examine the effectiveness of breaststroke swimming technique training using slow-motion video in improving the basic techniques of students in the Physical Education Program at Pamulang University. The research method employed was a quasi-experimental design with a pretest-posttest control group. The sample consisted of 40 students, divided into two groups: the experimental group received treatment using slow-motion video, while the control group underwent training using conventional demonstration methods. Assessment was conducted on five aspects of breaststroke technique: body position, arm movement, leg movement, breathing coordination, and movement rhythm. The results showed a significant improvement in technique scores in both groups, with the experimental group achieving a statistically higher improvement ($p < 0.05$). The average posttest score for the experimental group reached 20.15, while the control group only reached 16.85. The most notable improvements occurred in movement coordination and rhythm. The use of slow-motion video provided detailed visual feedback, allowing students to observe and correct movement errors independently. It can be concluded that slow-motion video is an effective learning medium for enhancing mastery of basic breaststroke techniques. These findings support the application of visual technology as an innovative strategy in motor skill learning, particularly in higher education physical education settings.

Keywords: breaststroke swimming, slow-motion video, basic technique, physical education, sports learning

© The Author(s). 2021 Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0>

INTRODUCTION

Physical education is an integral part of the national education system, aimed at developing students' physical, mental, emotional, and social aspects through various movement and sports activities. According to Siedentop (2011), physical education should provide learning experiences that build fundamental motor skills, promote active lifestyles, and strengthen students' character. In higher education, physical education students are expected not only to have theoretical knowledge but also practical skills in various sports disciplines, including aquatic sports such as swimming. These skills are essential for future professionals such as PE teachers, coaches, and fitness instructors.

Swimming is a sport that offers not only physical fitness benefits but also life-saving skills and supports community social activities. The WHO (2022) recommends swimming proficiency as part of water safety education, especially in countries with high water activity levels. Among various swimming styles, the breaststroke is the most commonly taught during initial swimming instruction due to its slow rhythm,

symmetrical movements, and extended breathing intervals—making it ideal for beginners (Bompa & Buzzichelli, 2019).

However, in practice, learning breaststroke technique is not as easy as it seems. Many PE students struggle to master the technique comprehensively. Field observations and literature reviews reveal that students often have difficulties synchronizing arm and leg movements, understanding proper breathing techniques, and maintaining a streamlined body position. Common errors include weak leg propulsion, overly wide arm pull, and inability to maintain stable rhythm (Hermawan & Nurmasari, 2021).

Learning challenges are also influenced by external factors. A high instructor-to-student ratio often results in less effective technique coaching. Limited practice time and inadequate facilities also impact skill mastery. Moreover, technique evaluation is typically done visually and subjectively, lacking technological support, making it difficult for students to receive specific, constructive feedback—hindering the learning process (Arifin & Khory, 2022).

To address these issues, various technology-based learning approaches have been developed. One increasingly popular method is the use of audiovisual media in sports skill learning. According to Dale (1969) and his “Cone of Experience” theory, learning is more effective when accompanied by visual and auditory experiences, as they enhance retention and understanding. In swimming, Marcela & Khory (2024) found that audiovisual media significantly increased knowledge (+18.25%) and skills (+9.88%) in breaststroke instruction.

Dinata (2021) also showed that using video learning improved middle school students’ breaststroke skills by 24.1%. Arifin et al. (2023) added that combining blocked practice with video visualization effectively shapes proper movement patterns and strengthens motor responses—especially for visual learners who require concrete understanding of movements.

However, most current learning media remain conventional. Videos shown at normal speed often fail to capture movement details such as hand-leg transition, head position during breathing, or optimal leg propulsion moments. This is where slow-motion video technology becomes essential. It allows significant deceleration of movements, enabling students to observe and analyze each movement phase in detail.

Haking and Soepriyanto (2019) emphasized that slow-motion video enables learners to better understand movement structures by visually revealing errors that aren't noticeable at normal speed. In professional sports, slow-motion video has long been used to analyze elite athlete techniques, such as breaststroke start, pull, and kick (Einfalt et al., 2018). Video analysis also improves movement efficiency, reaction time, and technical consistency (Cappa et al., 2022).

International swimming coach Slava Martynov stated that slow-motion video helps athletes identify hand entry points, maintain elbow angles, and eliminate unnecessary underwater movements: “Slow motion video gives swimmers a clear picture of what their body is doing in the water—something they can’t always feel.”

Despite its potential, there is still limited research specifically exploring the use of slow-motion video in breaststroke learning among PE university students, especially at Pamulang University. This represents a relevant research gap, as PE students are future educators who will pass these skills on to the next generation. Without effective learning methods and optimal technological support, the process of learning sports techniques may be slow and inefficient.

Considering the complexity of breaststroke technique learning and the significant potential of slow-motion video, this study was designed to evaluate the effectiveness of slow-motion-based breaststroke training in

improving the basic swimming techniques of PE students. The findings are expected to contribute to the development of technology-based teaching methods and provide concrete solutions for enhancing students' technical mastery.

MATERIALS AND METHODS

Study Design

This study employed a quasi-experimental design using a pretest-posttest control group. Participants were divided into two groups: an experimental group, which received breaststroke training using slow-motion videos, and a control group, which received traditional instruction through direct demonstration. Both groups underwent a pretest and posttest assessment to measure improvement in basic breaststroke techniques.

This design was selected to evaluate the effectiveness of slow-motion video as a teaching medium in comparison to traditional methods, with the control group serving as a valid benchmark and minimizing internal bias.

Participants

A total of 40 active students from the Physical Education Program, Faculty of Teacher Training and Education at Pamulang University, were selected as participants. They were enrolled in the "Swimming Techniques" course for the even semester of the 2024/2025 academic year and had not previously received formal breaststroke training.

Inclusion criteria:

- Active students in the Physical Education Program.
- Enrolled in the "Swimming Techniques" course.
- Willing to participate in all research activities and sign an informed consent form.
- Free from any injuries or health conditions that would hinder swimming.

Exclusion criteria:

- Students with experience as swimming athletes or coaches.
- Students attending fewer than 80% of training sessions.

Sampling was conducted through purposive sampling, with a balanced composition of 22 males and 18 females, evenly distributed across both groups.

Procedure. The study was conducted at the swimming facility of Pamulang University, equipped with a 25-meter pool and audiovisual teaching tools. The training intervention lasted for 8 weeks (March–May 2025) with two sessions per week.

Intervention Details:

- **Experimental Group:** Received breaststroke technique training using slow-motion video. The video presented the technical phases—glide, arm pull, leg kick, and breathing coordination—in slow motion, accompanied by verbal explanations and group discussions.

- Control Group: Received traditional training through live demonstrations without video support.

Training session structure:

- 10 minutes: warm-up (on land and in water)
- 20 minutes: technique instruction (video or demonstration)
- 30 minutes: practical application and

feedback

Assessment Instrument

Technique performance was assessed using an observation rubric based on the American Swimming Coaches Association (ASCA, 2020) standards, covering five main aspects:

1. Body Position (Streamline)
2. Arm Movement (Pull and Recovery)
3. Leg Movement (Kick)
4. Breathing Coordination
5. Movement Rhythm and Synchronization

Each aspect was scored on a 1–5 scale (1 = very poor, 5 = excellent), for a maximum score of 25. Two certified swimming instructors conducted the assessment, ensuring inter-rater reliability > 0.80.

Ethical Considerations

This study was approved by the Research Ethics Committee of Pamulang University. All participants received a detailed explanation of the study and signed an informed consent form. Participant confidentiality was maintained throughout the study.

STATISTICAL ANALYSIS

Data from the pretest and posttest were analyzed using SPSS version 26. The steps included:

1. Normality test using Shapiro-Wilk.
2. Homogeneity of variance using Levene's Test.
3. T-tests:
 - Paired Sample t-Test to assess within-group improvements.
 - Independent Sample t-Test to compare posttest results between groups.

The significance level was set at $p < 0.05$.

RESULTS

Table 1. Mean and Standard Deviation of Breaststroke Technique Scores

Group	Pretest (M ± SD)	Posttest (M ± SD)
Experimental	13.40 ± 2.10	20.15 ± 2.45
Control	13.65 ± 1.95	16.85 ± 2.23

Both groups showed improvements, but the experimental group achieved significantly greater gains. Table

2. Paired Sample t-Test Results (Within-Group Analysis)

Group	t-value	p-value
Experimental	14.276	0.000
Control	9.882	0.000

Significant improvements were observed in both groups ($p < 0.05$).

Table 3. Independent Sample t-Test (Between-Group Posttest Scores)

Comparison	Mean Difference	t-value	p-value
Experimental vs Control	3.30	4.125	0.000

The experimental group significantly outperformed the control group.

DISCUSSION

The findings indicate that breaststroke training using slow-motion video is significantly more effective than conventional demonstration in enhancing basic swimming technique among Physical Education students. The experimental group showed a greater increase in technique scores (6.75 points) compared to the control group (3.20 points).

Key improvements in the experimental group included:

1. Body Position (Streamline):

Slow-motion video allowed students to detect errors such as sagging hips or lifted heads, facilitating better correction—supporting Maglischo's (2003) assertion that body alignment is critical for efficiency.

2. Arm Movement:

Participants could analyze the pull, insweep, and recovery phases in detail, improving arm coordination. This aligns with Cappa et al. (2022), who found that segmented video enhanced motor comprehension in aquatic techniques.

3. Leg Movement:

The video enabled observation of the catch, kick, and glide phases, helping correct narrow or asymmetrical kicks. Similar results were reported by Angga Teguh et al. (2023), who noted a 24% improvement in leg propulsion through video learning.

4. Breathing Coordination:

Slow-motion facilitated synchronization between breathing and arm-leg actions. Wardiyanto (2021) highlighted that slow-motion enhances breathing rhythm awareness—essential for water-based sports.

5. Movement Rhythm and Synchronization:

Students better understood timing, movement cycles, and flow. According to Schmidt & Lee (2011), repeated visual observation activates stable motor schemas and improves efficiency.

Additionally, the slow-motion method improved student motivation and active participation, promoting self-analysis and correction, thus fostering learning ownership. As Coach Slava (2023) noted, “Slow motion video gives swimmers a clear picture of what their body is doing in the water—something they can’t always feel.”

In contrast, the control group's limited progress may be attributed to the one-directional nature of conventional teaching, which lacks visual feedback and repeatable demonstrations.

This research reinforces the value of audiovisual technology integration—especially slow motion—in teaching complex motor skills like swimming. It highlights the need for modern, technology-based pedagogy in training future Physical Education professionals.

CONCLUSIONS

Based on the data analysis and discussion, the study concludes the following:

1. Slow-motion video significantly enhances basic breaststroke technique among Physical Education students at Pamulang University, as evidenced by higher posttest scores in the experimental group.
2. The most significant improvements were seen in movement coordination, body alignment, and breathing rhythm.
3. Slow-motion-based learning offers a reflective and active experience, enabling students to observe, analyze, and self-correct movements.
4. The integration of video technology, especially slow motion, is highly relevant for teaching complex motor skills like swimming, where biomechanical precision is essential.
5. The study affirms the need for innovative, technology-supported learning models in preparing future PE teachers to meet 21st-century educational demands.

REFERENCE

- Arifin, A., & Khory, M. (2022). Evaluasi pembelajaran teknik olahraga berbasis teknologi dalam pendidikan jasmani. *Jurnal Pendidikan Olahraga dan Kesehatan*, 10(2), 145–152.
- Arifin, A., Khory, M., & Lestari, Y. (2023). Blocked practice dan video demonstrasi dalam peningkatan keterampilan motorik renang siswa. *Jurnal Olahraga Prestasi*, 9(1), 78–88.
- ASCA. (2020). *Stroke performance evaluation and correction manual*. American Swimming Coaches Association.
- Bompa, T. O., & Buzzichelli, C. (2019). *Periodization: Theory and methodology of training* (6th ed.). Human Kinetics.
- Cappa, S., Gatta, G., & Cortesi, M. (2022). The impact of video-based feedback on swimming technique improvement: A systematic review. *Sports Biomechanics*, 21(4), 456–470. <https://doi.org/10.1080/14763141.2020.1801671>
- Dale, E. (1969). *Audio-Visual Methods in Teaching* (3rd ed.). Holt, Rinehart and Winston.