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From Technique to Coordination: Effective Learning Strategies to Improve Butterfly Stroke Motor Skill Mastery in Elementary School Students (A Systematic Literature Review)

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I. Introduction

The butterfly stroke is widely recognized as one of the most technically demanding swimming styles, requiring precise coordination between arm pull, dolphin kick, and rhythmic breathing. At the elementary school level, this complexity often becomes a learning barrier due to children's limited core strength, developing motor coordination, andshort attention span. Most empirical studies on butterfly stroke instruction focus on adolescent or adult swimmers, resulting in limited synthesized evidence on pedagogically appropriate learning strategies for younger learners. Therefore, this study aims to systematically review and synthesize empirical evidence on effective and developmentally appropriate learning models to improve butterfly stroke motor skill mastery among elementary school students.

II. Methods

This study employed a Systematic Literature Review (SLR) guided by the PRISMA framework. Research questions were formulated using the PICO approach:

Table I
PICO Framework for the Systematic Literature Review

Component	Description
Population (P)	Elementary school students participating in swimming lessons or extracurricular programs
Intervention (I)	Modified learning models (part method, game-based learning)
Comparison (C)	Conventional teaching methods or drill-based instruction
Outcome (O)	Improvement in butterfly stroke motor skills (coordination, arm pull, dolphin kick)

Compared with conventional drill-based instruction, these adaptive approaches produced more stable improvements in movement quality and offered safer and more enjoyable learning experiences, supporting learner-centered motor learning principles.

III. Results and Discussion

The synthesis identified two dominant learning approaches that consistently improved butterfly stroke skill acquisition in elementary school student

Table II
Summary of Learning Strategies and Outcomes

Learning Strategy	Key Characteristics	Reported Outcomes
Modified Part-Method	Skill decomposition, progressive integration, focus on dolphin kick and arm pull	Improved coordination, technical accuracy, reduced learning difficulty
Game-Based Learning	Playful tasks, meaningful contexts, learner-centered activities	Increased motivation, engagement, and stable movement quality

IV. Conclusions

The reviewed evidence indicates that modified learning models, particularly the integration of part-method and game-based learning, are effective and developmentally appropriate strategies for improving butterfly stroke motor skill mastery among elementary school students. These approaches align movement complexity with children's motor development while maintaining learning motivation. Future studies employing longitudinal designs are recommended to strengthen evidence in school-based and extracurricular swimming contexts. Literature searches were conducted using Google Scholar and relevant academic databases for peer-reviewed studies published between 2021 and 2024. Inclusion criteria focused on empirical studies involving elementary-aged participants, instructional interventions targeting butterfly stroke or its key components, and clearly reported motor skill outcomes.

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