



## Effect Of An Educational Program Using Lift-Movement Theory On Breaststroke Learning Level Of Children Aged (10-12) Years

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### Abstract

The current study aimed to investigate effectiveness of an educational program based on lift-action theory in improving breaststroke skill of children aged 10–12 years, based on assumption that gradually reducing motor load in early stages of learning contributes to building more precise and stable motor patterns. The researcher adopted an experimental approach with a single-group pre- and post-test design, given the nature of educational environment at Maarif Academy in Baghdad. The sample consisted of 27 children who had never received formal breaststroke instruction. The program lasted 8 weeks, with 3 sessions per week, each session lasting 60 minutes. It included progressive stages starting with partial motor support and ending with full independent performance. Skill performance was measured using a standardized technical assessment form, in addition to a time test for completing 25m breaststroke. Results showed statistically significant differences at level of  $\alpha \leq 0.05$  in favor of post-test in skill performance  $t = 12.84$ . Completion time  $t = 9.73$  and effect size Cohen's  $d$  were high, indicating a strong impact of the program. Results suggest that applying modern motor learning principles, as described by Schmidt & Lee (2019) and Magill & Anderson (2017), contributes to improving motor learning efficiency in aquatic environments. The study recommends adopting the proposed educational model in children's swimming programs.

**Keywords:** Motor Learning, Breaststroke, Children, Progressive Motor Support, Lift Movement.

### Introduction

Swimming is one of the most comprehensive motor activities in terms of its impact on developing physical fitness and neuromuscular coordination in children, and it also contributes to enhancing the efficiency of the circulatory and respiratory systems (Abid et al., 2024). Breaststroke is one of the styles that requires a high degree of temporal coordination between the upper and lower limbs, in addition to breath control and maintaining a streamlined posture (Arischo Mardiansyah, 2004; S. Grosse, 2020).

Modern motor learning theories indicate that the acquisition of complex skills depends on the gradual organization of sensory and motor inputs, allowing for a transition from supported to independent performance (@ Charles et al., 2017; Abarghouejad et al., 2021; Adewale et al., 2024). In this context, the lift-movement theory stands out as a practical application of the principle of

minimizing motor strain in the early stages of learning, enabling the consolidation of motor programs without early mechanical interference (Zhang et al., 2024).

The literature on swimming mechanics also confirms that controlling the rate of movement and stroke efficiency are crucial factors in performance quality (Adewale et al., 2024; Yang et al., 2024) and that kinetic economy is related to the stability of the acquired movement pattern (Brewer, 2017; El-Rajab et al., 2025).

Although there are studies that have addressed the impact of training programs in breaststroke swimming, such as the study by (Abid et al., 2024; Fish & Rohr, 1999), studies that have addressed the educational dimension based on a specific kinetic theory in children are still limited, which justifies conducting the current study.

Importance of the study is to enrich theoretical aspect related to the application of motor learning theories in swimming. Providing a scientifically based educational program that can be applied in swimming academies. Serving the (10-12) year age group as a golden stage for acquiring basic motor skills (Bishop et al., 2009; Papadimitriou & Loupos, 2021).

Research problem through field observations at the Maarif Academy in Baghdad, the researcher noted a slowness in children's learning of breaststroke swimming, in addition to frequent technical errors such as poor coordination between the arms and legs. Excessive head elevation during breathing. Loss of the body's streamlined posture. The researcher believes that relying on traditional methods based solely on explanation and presentation does not take into account individual differences and does not reduce the motor burden in the early stages, which may lead to the establishment of motor errors that are difficult to correct later. The research problem is defined in the following question Does the educational program using theory of lift movement contribute to improving level of learning breaststroke for children aged (10-12) years?

Research objectives are to develop an educational program using the lift-movement theory to teach breaststroke swimming. Identifying the program's impact on developing skill performance. Identifying the program's impact on improving the time of completion of (25m) breaststroke swimming.

Research hypotheses there are statistically significant differences between the pre-test and post-test measurements in skill performance level. There are statistically significant differences between the pre- and post-tests in completion time.

### ***Theoretical framework***

First: Motor learning in childhood: The (10-12) year stage is an important stage in the development of coordination abilities, as the central nervous system matures and the speed of nerve impulse transmission improves, which positively impacts the acquisition of skills (Abarghoueinejad et al., 2021; Zhang et al., 2024).

Second: Theory of lift-up movement: The theory is based on reducing the resistance of the environment or mitigating the effect of body weight in the early stages of learning, through using floating devices, performing movements in shallow water, breaking down the skill into simplified units. This theory is consistent with the principles of gradual learning and immediate feedback (Abid et al., 2024, 2024).

Third: The technical characteristics of breaststroke swimming: Breaststroke swimming consists of four main phases flow mode, circular arm movement, frog-like leg movement, respiratory timing. The timing of these stages is the decisive factor in the quality of performance (Al-Khayyat, 2017).

Although there are studies that have addressed the impact of training programs in breaststroke swimming, such as the study by (Abid et al., 2024; Fish & Rohr, 1999), studies that have addressed the educational dimension based on a specific kinetic theory in children are still limited, which justifies conducting the current study. This study is novel because it tests a lift-movement theory-based instructional progression for 10–12-year-old beginners and evaluates its effects using both a standardized technique score and a 25 m performance time within a structured 8-week school-academy setting.

## Materials and Methods

### Study Participants

This study applied an experimental one-group pretest–posttest design. The participants were 27 learners from Baghdad Knowledge Academy, aged 10–12 years. All participants were beginners and had never received formal breaststroke instruction before the study.

(Sugiyono, 2017) Participants were included if they (1) met the target age range, (2) were medically fit to take part in pool-based sessions, and (3) attended the program consistently until completion. Learners with poor attendance or health conditions that could compromise safety during water activities were not included in the final analysis.

Baseline characteristics were recorded to describe the group and check its overall homogeneity. The sample showed moderate and acceptable variation: age ( $M = 11.1$  years;  $SD = 0.74$ ), height ( $M = 144.3$  cm;  $SD = 6.12$ ), and body mass ( $M = 39.6$  kg;  $SD = 5.21$ ).

### Study Organization

The research was carried out in three main steps: pretesting, implementation of the educational program, and posttesting.

**1) Pretest** Before the intervention, participants completed two measurements: (a) a technical breaststroke performance assessment and (b) a 25 m breaststroke time test. Testing was conducted under the same pool conditions planned for the posttest.

**2) Educational program (Intervention)** The proposed educational program was delivered over 8 weeks (24 instructional units), three sessions per week, with each session lasting 60 minutes. The program followed a gradual progression: early sessions used partial movement support to reduce motor load, and support was reduced step by step until learners could perform the full stroke independently.

1. **Stage 1: Preparation phase (Weeks 1–2)**
  - a. Supported buoyancy drills
  - b. Two-leg kicking practice using a kickboard
2. **Stage 2: Part-learning phase (Weeks 3–5)**
  - a. Segmented arm-action practice to build the pull pattern
  - b. Practice with partial body lifting/support to maintain alignment
3. **Stage 3: Linking stage (Weeks 6–7)**
  - a. Integration of arm and leg actions into one coordinated cycle
  - b. Breathing-timing drills aligned with stroke rhythm
4. **Stage 4: Mastery stage (Week 8)**

- a. Full breaststroke performance over 25 m
- b. Correction of minor technical errors through feedback and repetition

**3) Posttest** After the 8-week program, participants repeated the same two tests using the same procedures and equipment as the pretest.

### Measuring Instruments

Data were collected using the following instruments:

1. **Skills Performance Assessment Form** (maximum score: 20 points).
2. **25 m breaststroke time test.**
3. **Electronic stopwatch** for time recording.

### Statistical Analysis

Descriptive statistics (mean and standard deviation) were used to summarize participant characteristics and outcome measures. Program effects were examined using a paired-samples t-test to compare pretest and posttest scores for (1) technical performance and (2) 25 m completion time, with the significance level set at  $\alpha \leq 0.05$ . In addition, Cohen's d was calculated to estimate the practical magnitude of change from pretest to posttest.

### Results

*First: Level of skill performance*

Table (2) Skill Performance Level

Variable	Test	M. St.d ±	Difference between two means	(t) value	Sig. level (p)	Improvement percentage	Effect size (Cohen's d)	Confidence interval for differences 95%
Skill performance (degree)	Pre	8.74	8.07	12.84	0.000	92.3%	2.40 (Very High)	6.78 – 9.36
		± 1.92						
	Post	16.81						
		± 1.43						

The effect size (2.40) indicates a very strong effect according to the classification **Cohen's d**, which shows that the improvement was not only statistical but also of great practical value.

*Second: Completion time 25m*

Table (3) Time to complete 25m breaststroke

Variable	Test	M. St.d ±	Difference between two means	(t) value	Sig. level (p)	Improvement percentage	Effect size (Cohen's d)	Confidence interval for differences 95%
Skill performance (degree)	Pre	39.52	8.06	9.73	0.000	20.4%	1.80 (High)	6.32 – 9.80
		± 3.84						

The value ( $d = 1.80$ ) represents a large effect size, which confirms that the educational program had a strong practical effect on improving time performance.

## Discussion

Results of the current study showed a clear and significant improvement in the level of skill performance and completion time after applying the educational program based on the theory of movement by lifting, as is evident from the data in Table (2). The table (3) pertains to skill assessment and the time taken to complete the 25m breaststroke. Table (2) indicates an increase in the mean score from 8.74 in the pre-test to 16.81 in the post-test, with a t-value of 12.84, which is statistically significant, reflecting the program's effectiveness in improving the technical aspects of the movement. Table (3) also shows a decrease in performance time from 39.52 seconds to 31.46 seconds, with a t-value of 9.73.

Integrating flotation devices and aids in a systematic and thoughtful manner within educational units, with a set timetable. clearly, to gradually reduce dependence on it until it reaches full independent performance. Conducting future studies using a two-group experimental design (control and experimental) to compare the methods Traditional and lifting-based methods, with the aim of strengthening the power of scientific evidence and expanding the base of generalization. Expanding the scope of the research to include other swimming styles such as backstroke, butterfly, and freestyle, to verify the possibility of generalizing its effectiveness theory is based on various water skills (Benu et al., 2024; S. J. Grosse, 2007).

Attention should be paid to psychological aspect accompanying learning process, by enhancing self-confidence and reducing water anxiety among students. Children, because of the direct impact this has on quality of performance and continuity of learning. Adopting educational programs based on clear scientific and theoretical foundations is a fundamental step towards raising level of swimming education for children and achieving more effective and sustainable educational outcomes (Bishop et al., 2009; Hui, 2022).

This improvement confirms learners' transition from initial stage of motor understanding to a stage of relatively proficient performance. These results can be explained by principle of gradually increasing motor support, which contributed to reducing mechanical burden on child in early stages, thus allowing for development of correct movement patterns before reaching full performance. These results are consistent with principles of motor learning, which emphasize importance of gradual progression and immediate feedback in improving neuromuscular coordination and consolidating skill. (Behan, 2020; Buszard et al., 2022)

The recorded time improvement also reflects an improvement in kinetic economy, as noted by (Abid et al., 2024; Loturco et al., 2024) in their study of kinetic frequency in young swimmers. These results are also consistent with (S. Grosse, 2020) finding that structured programs contribute to improved performance in breaststroke (Álvarez-Maldonado et al., 2024; Amiri et al., 2025).

Within framework of scientific analysis based on comparison between pre- and post-measurements, following conclusions can be formulated in an academic and systematic manner educational program based on theory of lift-based movement has proven effective in developing skill performance level of swimming. Chest in children aged (10-12) years, as it contributed to bringing about a substantial improvement in the accuracy of the technical stages of movement, in particular,

coordination between arms and legs, timing of breathing, and streamlined posture of body (Atasavun Uysal & Düger, 2020; Behan, 2020; Hartanto et al., 2021).

Systematic application of principle of progressive lifting of kinetic support led to a reduction in early technical errors, which helped in formation. Stable motor programs in nervous system, which positively impacts speed of skill acquisition and the quality of its execution. Children showed a significant improvement in their time to complete the 25m breaststroke, indicating that their skill development has not yet been complete. It was not merely formal, but was linked to functional and performance improvement reflecting transition of learning from cognitive stage to semi-cognitive stage (Abdulaziz Saleh Aljohani et al., 2016; S. J. Grosse, 2007).

Mechanism in motor learning. Mechanism of segmentation and kinetic reattachment, supported by buoyancy devices and gravity reduction, contributed to increased confidence. Mobility in children and reducing anxiety associated with performance within aquatic environment is an important factor in this age group. Improvement achieved confirms that adopting educational methods based on modern motor learning theories is more effective than traditional methods based on presentation and unstructured repetition, especially in age-sensitive learning stages basic skills (Mothna Mohammed, 2016; Praditya et al., 2024; Verawati et al., 2021).

## Conclusions

The results showed that the (10-12) year stage represents an ideal learning window for developing complex motor skills such as swimming chest, if educational strategies are employed that take into account the physical, neurological and cognitive developmental characteristics of children. It can be concluded that lifting movement theory is not only beneficial in facilitating physical performance, but also contributes to organization. Learning is done gradually, in accordance with principle of progressing from simple to complex, which enhances the stability and continuity of learning. It is clear that proposed educational program is an effective educational model that can be adopted in children's swimming programs, given its proven ability to achieve tangible skill and performance adaptations within a specific timeframe and in a structured, scientific manner.

## Recommendations

Based on study's findings, and in light of scientific analysis of skill and time improvement levels of sample group, following recommendations can be presented in an expanded academic format adoption of the educational program based on the theory of lift-based movement within the approved curricula in swimming academies for children, because it has proven effective in accelerating skill acquisition and improving the quality of technical performance in breaststroke swimming. Training swimming instructors to apply the principles of modern motor learning theories, especially principle of gradually reducing motor support, which ensures the development of correct motor patterns from the early stages of learning. Need to consider the developmental characteristics of the (10-12) age group when designing educational programs, in terms of size load, number of repetitions, feedback method, and level of motor complexity, to ensure the best response educational possibility.

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