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Assessing the Effectiveness of Buoyancy Boards Made from EVA Foam and EPP in Enhancing Skill Learning in Novice Swimmers

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Abstract:

The present study examined the efficacy of employing a floating board made of EVA and EPP foams to instruct young swimmers on the fundamentals of swimming. A questionnaire was distributed to 31 coaches from various clubs in the Wilaya of Boumerdes, who were responsible for training novices during the 2024–2025 sports season, using a descriptive analytical methodology. The chi-square (χ^2) test was employed to conduct statistical analysis of the collected data. The study's specific objective was to evaluate the extent to which the floating board facilitated the acquisition of breathing control, arm pulls, and leg kicks by students, which are indispensable components of novice swimming. The results suggest that the board was effective in facilitating the proper and balanced execution of leg kicks, promoting regular and coordinated respiration with movement, and improving the precision of arm pulls, thereby improving the transition to the freestyle technique.

Keywords: **a buoyancy board; EVA foam; EPP foam ; skill learning; novice swimmers**

Article info

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1. Introduction

Swimming is a comprehensive sport that can be practiced across various age groups. It enhances physical, motor, and technical capacities and serves as an effective means of promoting the integrated development of children and adolescents (Kratbi, 2017). The aquatic environment presents additional challenges compared to land-based activities due to the high resistance of water, which "dissipates the swimmer's energy to a greater extent" (Aristote, 1983, pp. 209-210). This aspect necessitates the provision of supportive teaching aids that enable beginners to adapt to the environment and gradually develop their skills. In this context, kickboards (buoyancy boards) have emerged as a fundamental pedagogical tool in swimming education. They provide support and stability in the water, allowing learners to concentrate on partial movements—particularly leg kicks and limb coordination (Abdulkadhim & Kri, 2023). Such aids also enhance beginners' self-confidence by reducing fear of water and establishing streamlined balance—an essential prerequisite for acquiring more complex skills such as arm pulls and breathing control (Kratbi, 2018). With industrial and educational advancements, new materials have been utilized in kickboard manufacturing, EVA and EPP foams. These materials are lightweight, flexible, durable, and resistant to degradation from water and chlorine, making them well-suited to aquatic learning environments. Their characteristics contribute to safer, more effective teaching by reducing physical exertion and increasing actual practice time in the water (Oukili et al., 2019). Recent studies also indicate that feedback—particularly visual feedback—plays a critical role in improving specific technical skills in novice swimmers: Haji (2022) showed that visual feedback is better than verbal feedback for learning how to start freestyle. Similarly, Yaakoubi (2013) found that a training program based on pedagogical media improved basic front crawl skills in youth swimmers, reinforcing the educational value of teaching aids in developing motor and technical abilities. Overall, the literature suggests that modern teaching aids—such as kickboards made of EVA and EPP—accelerate learning and enhance the acquisition of basic swimming skills, including buoyancy, balance, and leg kicks. These tools also make it easier to give feedback and fix technical mistakes during a performance (Oukili et al., 2019). They support a part-practice pedagogy whereby individual elements are taught separately before being integrated into a whole performance—consistent with contemporary motor learning principles. Accordingly, an EVA/EPP kickboard represents a qualitative addition to swim instruction: it combines mechanical properties that ensure a safe and effective learning environment with pedagogical value that eases motor learning—making it an indispensable tool in beginner swimming programs.

Based on the above, the main research question for this study is as follows:

Does using a buoyancy board made of EVA and EPP foam effectively improve the acquisition of basic swimming skills among novice children?

Under the general question, there are three sub-questions:

a) How does the use of an EVA/EPP buoyancy board impact the teaching of breathing techniques to novice children?

b) How does the use of an EVA/EPP buoyancy board impact the teaching arm pulls to novice children?

c) How does the use of an EVA/EPP buoyancy board impact the teaching of leg kicks to novice children?

General Hypothesis

Using a buoyancy board made of EVA and EPP foam has a strong positive effect on skill learning among

young swimmers.

Specific Hypotheses

a) Utilizing an EVA/EPP buoyancy board greatly enhances the ability of young swimmers to master the breathing technique.
b) Employing an EVA/EPP buoyancy board significantly aids young swimmers in developing the arm pulls skill.
c) The use of an EVA/EPP buoyancy board markedly improves the learning of the leg-kick skill among young swimmers.

Study Objectives

This study aimed to assess the effectiveness of using a buoyancy board made of EVA and EPP foam in skill learning among young swimmers, specifically by examining the effectiveness of the board in learning proper breathing, arm pulls, and leg kicks during swimming.

2. Prior Studies

Study 1: Mohamed El-Arabi Haji (2016), "Sports training using games and its effect on the educational level of beginners in swimming aged 6–10 years"—conducted on clubs affiliated with the Algerian Swimming League. This study addressed the underuse of games in this age group (6–10 years), focusing on their effect on technical learning and chronometric improvement. It concluded that training with games was effective, as shown by the large and observable improvement rates in the experimental group compared to those in the control group.

Study 2: Zerrouk Mohamed & Thoameria Ahmed (2017), "The relationship between certain physical attributes and skill performance among novice swimmers (ages 9–13)," University of Ziane Achour, Djelfa. This study aimed to identify the relationship between strength, endurance, and speed when performing skills such as gliding, buoyancy, and prone swimming, and to determine each attribute's contribution to performance. A descriptive method was used with a sample of 16 swimmers. Key findings showed that endurance, speed, and strength contribute to the performance of some skills among youth swimmers and that physical attributes are related to technical performance in swimming.

Study 3: Ghassan Habib Abdul-Wahab & Najem Tashar Izzat, "Somatotype and its relationship to **skill**-learning level in freestyle for beginners aged 8–10 years," Department of Student Activities, University of Basra. This study sought to examine the relationship between somatotype and freestyle learning level among novice children and hypothesized a significant relationship. Using an experimental approach, a purposive sample of 15 learners (ages 8–10) enrolled in summer courses at the Closed Fuel Pool was selected for the study. The authors concluded that somatotype influences the efficiency of learning the freestyle stroke.

3. Method and Materials

3.1 The Method used

The study relied on the descriptive-analytical approach, which is a method based on collecting facts and data related to the phenomenon under study, then organizing, analyzing, and interpreting them to reach objective conclusions. This methodology was chosen because it is the most suitable for describing the phenomenon of teaching basic swimming skills to beginners and for studying the effectiveness of using a kickboard made from EVA and EPP foam.

3.2 Participants

The sample consisted of a purposive (non-probability) selection of 31 sports coaches employed at

swimming pools in Boumerdes Province. We selected these coaches because they facilitated the data collection process and had a direct link to the variables under examination.

3.2 Study Design

A structured questionnaire consisting of 24 questions was administered. It included:

- Items related to coaches' personal information.
- Closed-ended items were designed to assess their perceptions of the effectiveness of using a buoyancy board in swimming instruction.
- The questionnaire's goal was to gather both quantitative and qualitative information about how well the board helped new swimmers improve their skills.

Data were analyzed using the chi-square (χ^2) test to determine statistical significance in relation to the study's hypotheses.

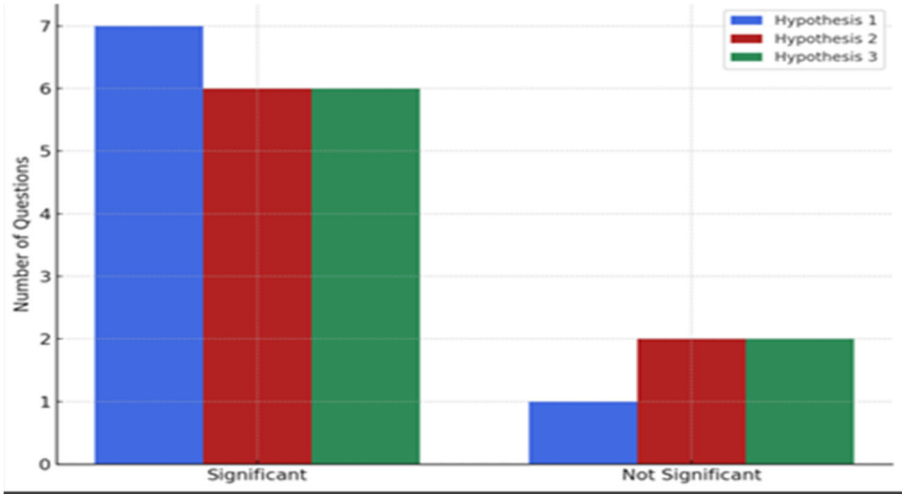
Temporal Scope: The questionnaire was administered in March of the 2024/2025 academic year and required approximately one month to complete. Coaches responded individually, at their convenience, typically during rest periods. while The Spatial Scope: The study was conducted in various swimming pools across Boumerdès Province.

Table 1. Effectiveness of Buoyancy Board (EVA/EPP) Across Hypotheses

Question	H1: Yes %	H1: No %	H1: Sig.	H2: Yes %	H2: No %	H2: Sig.	H3: Yes %	H3: No %	H3: Sig.
1	90.32	9.67	Significant	96.77	3.22	Significant	96.77	3.22	Significant
2	83.87	16.12	Significant	87.09	12.90	Significant	90.32	9.67	Significant
3	96.77	3.22	Significant	96.77	3.22	Significant	83.87	16.12	Significant
4	83.87	16.12	Significant	41.93	58.06	Not Sig.	90.32	9.67	Significant
5	67.74	32.25	Significant	90.32	9.67	Significant	51.61	48.38	Not Sig.
6	3.22	96.77	Significant	87.09	12.90	Significant	9.67	90.32	Significant
7	61.29	38.70	Not Sig.	6.45	93.54	Significant	58.06	41.93	Not Sig.
8	90.32	9.67	Significant	51.61	48.38	Not Sig.	80.64	19.35	Significant

Notes: "Sig." indicates statistical significance per χ^2.

Fig.1. Bar Chart Representing the Results of the Study Hypotheses



The table indicates that most elements were statistically significant, demonstrating the effectiveness of the buoyancy board in teaching breathing techniques to novice swimmers. The survey participants largely concurred that the board facilitated easier and more stable breathing. Item 7 was not significant, suggesting that variations in children's body weight have little impact on their performance on the board. This finding underscores the board's utility as a tool to assist children who encounter difficulties learning to swim. Regarding Hypothesis 2 (arm pulls), most items showed significance, reflecting a consensus that the buoyancy board aids in teaching arm pulls to beginners, particularly in terms of stability, coordination, and overcoming challenges. Two items did not show relevance, indicating that differences in children's weight did not significantly hinder the use of the board. This highlights the board's adaptability and effectiveness for a diverse range of learners. For Hypothesis 3 (leg kicks), the majority of elements were significant, indicating that the board is effective in teaching leg kicks by enhancing stability and providing technical support while ensuring uniform understanding. Only one item was not significant, suggesting that challenges may arise from factors such as prior experience or the child's physical readiness rather than from the use of the board itself.

4. Discussion in Light of the Hypotheses

Hypothesis 1: Utilizing an EVA/EPP buoyancy board greatly enhances the ability of young swimmers to master the breathing technique. Items (1, 2, 3, 4, 5, 6, and 8) support this hypothesis, while item 7 was not significant. This aligns with Abu Tama' (undated), who found significant post-test differences favoring an experimental group trained with buoyancy aids, recommending their use for teaching skills and swim strokes. Practically, a kickboard stabilizes the body, allowing learners to focus on the timing and coordination of inhalation and exhalation without worrying about balance. It also enables coaches to isolate and teach breathing, accelerating learning and increasing session effectiveness. Therefore, we conclude that Hypothesis 1 has been achieved.

Hypothesis 2: Employing an EVA/EPP buoyancy board significantly aids young swimmers in developing the arm pull skill: The statistical results show significance for items 1, 2, 3, 5, 6, and 7, while items 4 and 8 were not significant. The board provides stable support for the body during arm movements, reducing the effort needed to maintain balance and enabling focused practice on the technique (Girold et al., 2007, p. 187). Coaches also use the board to decompose the skill and teach it progressively, so young swimmers can master arm movements separately before integrating them (Salim 2014, p. 104). Salim's study, "The Effectiveness of Using Buoyancy Aids in Teaching Basic Swimming Skills," found that teaching aids directly improve learners' motor control and attention to technical aspects, particularly for complex skills like arm pulls that necessitate angle control and coordination with water propulsion (Salim, 2014, p. 105). The insignificance of item 8 may stem from external factors, such as age variation or disparities in physical fitness, necessitating a more thorough examination of the interactions between learner characteristics and teaching aids. Maglischo (2003, p. 92) also emphasizes isolating complex elements—such as teaching arms with a board—so that precise movements can be acquired and stabilized before transitioning to composite skills. Overall, Hypothesis 2 was largely achieved.

Hypothesis 3: The use of an EVA/EPP buoyancy board markedly improves the learning of the leg kick skill among young swimmers: Items (1, 2, 3, 4, 6, and 8) showed significance, supporting this hypothesis. Items 5 and 7 did not reach significance, indicating that some aspects of leg-kick learning may not be directly affected by the board or may be influenced by factors such as physical fitness and coaching experience. This result is consistent with Abu Tama' (2019), who reported significant differences favoring

the use of buoyancy aids (including kickboards) when learning basic swimming skills such as leg action. Maglischo (2003, p. 82) pointed out the value of part practice and using a board to stabilize the trunk and head so that the legs can be trained independently. This technique allows coaches to deliver precise feedback on leg movements and achieve progressive and noticeable improvements in novice athletes' performance. Therefore, we consider the achievement of Hypothesis 3 to be significant.

5. CONCLUSION

This study highlights the practical value of pedagogical aids in swimming instruction, particularly for young learners acquiring the basic skills that form the foundation of swimming. The results show that using buoyancy boards made of EVA and EPP foams meaningfully improves children's performance of essential aquatic motor skills due to the materials' physical properties—flexibility, light weight, and high buoyancy—which reduce fear and boost confidence in the water. We recommend systematically integrating EVA/EPP kickboards into training sessions in clubs, schools, and training centers to enhance learning quality, motivation, and physical and psychological development in water. Future research can explore complementary factors such as color, shape, size, and age-tool matching to further optimize methods for teaching children to swim.

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