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The effect of using Posner's model (of conceptual change) on academic achievement and the acquisition of freestyle swimming skill performance for students

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Abstract

The research investigates the effectiveness of Posner's model of conceptual change in the context of teaching freestyle swimming to students. The study employs an experimental methodology where the impact of this model on both academic achievement and the acquisition of skillful performance in swimming is assessed. The research outlines a clear problem that current teaching methods in swimming education do not effectively address misconceptions nor foster the creation of new cognitive structures among learners. Posner's model, known for correcting misconceptions and promoting the formation of accurate concepts, is adopted and applied to an experimental group, while a control group continues with traditional teaching methods. The educational program designed for this study is implemented over two months, with a total of eight instructional units delivered weekly. The program incorporates steps from Posner's model, such as presenting problems, discussion, making predictions, and applying scientific concepts. Post-instructional tests are conducted to evaluate the effectiveness of the program. The results show significant improvements in the experimental group's academic performance and swimming skills, affirming the positive impact of Posner's conceptual change model. Conclusions drawn from the research emphasize the positive influence of Posner's model on students' academic and skill performance in freestyle swimming. The researcher recommends the application of this model in teaching other age groups and sports disciplines, suggesting that a focus on conceptual understanding can significantly enhance learning outcomes.

Keywords: Model, performance, acquisition

1. Introduction

The scientific revolution and advancements in various fields, particularly in education, necessitate the exploration and acquisition of knowledge and information. This is achieved by providing educational experiences that ensure the introduction of new changes to learners' cognitive structures. This involves what the teacher supplies to students in terms of introductions and preliminary information to pave the way for presenting new information that changes concepts or a concise introductory material presented at the beginning of the educational situation. This material focuses on the structure of the subject and the information to be addressed, aiming to facilitate the learning of related concepts. This is done through linking information, fostering the intellectual growth of learners, and ensuring the accuracy and relevance of the information provided. Understanding mathematical concepts is crucial as they are part of the knowledge that requires learners to comprehend the nature and evolution of swimming, and to provide them with scientific experiences that enrich their cognitive structures. This is done by motivating learners, considering individual differences, and offering opportunities for inquiry and exploration in the mental development process, connecting old and new concepts. The importance of this research lies in using Posner's model of conceptual change, which creates an interactive environment between student and teacher through scientific dialogue and an educational and scientific atmosphere. This stimulates learners by connecting the information they have learned with what they are currently learning.

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This paper discusses the significance of this theory, aiming to reach conclusions and understandings that benefit from the theory's propositions. Hence, the need to research how to effectively deliver concepts and information to learners in a way that ensures their accuracy and relevance. According to Qadouri (2017) [11], Posner's model works to correct misconceptions and replace them with accurate concepts, supported by four strategies: bridging, discrimination, conceptual exchange, and integration. Students can learn concepts at different stages of development, provided that each concept is understood and represented in a manner consistent with their cognitive and mathematical maturity. This stage benefits from the sequential growth in mathematical concepts and the development occurring in the human mind. Posner's model, which this research focuses on, is one of the models that dealt with the concept (The concept) and proposed several strategies aimed at correctly conveying concepts to students. It stimulates what has been stored in the student's mind from a superficial or incorrect view of a concept. The researcher believes that conceptual thinking influences learners in improving and increasing the achievement level of students in swimming lessons. This is due to the active and scientific engagement that relies on guiding learners in linking information and forming a correct and error-free cognitive structure.

2. Research Problem

Based on the researcher's experience in teaching swimming and reviewing sources and research literature in this field, along with their expertise in swimming education and training, a significant lack of use of modern models, methods, and learning techniques in swimming education for students was observed. There was also a lack of focus on changing incorrect concepts among learners, not rectifying mistakes, and not forming new cognitive structures. The researcher employed Posner's model of conceptual change due to the challenges of teaching swimming skills. Swimming instruction requires a unique approach, as it needs accurate information delivery in a different environment from the usual

educational settings, being in a water-based environment distinct from the normal terrestrial setting, differing from other sports. Research Objectives: The current research aims to understand the impact of using Posner's model of conceptual change on the academic achievement in freestyle swimming for students. The current research aims to understand the impact of using Posner's model on acquiring skillful performance in freestyle swimming for students. Research Hypotheses: There are significant statistical differences in the post-test academic achievement in swimming for students. There are significant statistical differences in the post-test for acquiring skillful performance in freestyle swimming for students.

3. Materials and Methods

Research Method Every scientific research requires finding appropriate solutions through the selection of a suitable method that aligns with the nature of the problem and the research procedures. Therefore, the researcher utilized the experimental method, which is the most valid approach for practically and scientifically solving many scientific problems, The research population was deliberately determined, represented by first-year students, totaling 120 students. Two sections (B-C) were chosen through a lottery, comprising 61 students. The experimental group included 20 students, and the control group had 21 students. Five students participated in the pilot study. Students who did not adhere to the educational units, totaling 16, were excluded. The research sample represented 50.83% of the original population.

4. Equivalence of the Research Groups

The researcher conducted an equivalence test for both the experimental and control groups. This test was conducted after delivering two instructional units to assess skill level before the test. This was to ensure that both groups were homogeneous and equivalent and that all students were at the same level. This approach was to start from an identical baseline, as shown in Table (1).

Table 1: This approach was to start from an identical baseline

Variables	Pre-test		Post-test		Value (t) Calculated
	Mean	Standard Deviation	Mean	Standard Deviation	
Regular breathing test for 10 seconds.	6.783	1.564	5.976	1.878	0.897
Buoyancy.	12.545	2.634	11.768	3.768	0.976
Flow (Gliding).	5.232	2.573	4.879	3.225	0.185

5. Tests and Measurements

The skill tests for freestyle swimming adopted are those approved by the Red Cross for beginners. These tests are used to identify the strengths and weaknesses of the research sample or to determine the effectiveness of the methodology used in the scientific research. The most objective approach to testing freestyle swimming performance is through standardized observation.

1. Breath-holding test for 10 seconds.
2. Back float test in water. Glide (forward slip) test.
3. Technical performance test for freestyle swimming
4. Academic Achievement Test

The researcher relied on the final grades of the students, which were approved by the course instructor at the end of the academic term. These grades were determined after conducting both practical and theoretical exams by the

instructor, with both the experimental and control groups undergoing the same conditions, study material, and exams.

6. Pilot Experiment

The pilot study is a scaled-down version similar to the main experiment. The pilot study was conducted in the People's Olympic Pool and included five learners outside of the main research sample. The purpose of the pilot study was to determine the feasibility of applying the tests and confirming their suitability. Additionally, it aimed to identify the difficulties and obstacles faced by the researcher, the workflow fluidity, and the method of recording information and observations. It also served to ensure the research team's understanding of how to implement and itemize the tests and their distribution to know their roles when conducting the main tests.

7. Main Experiment

7.1 The Educational Program

The researcher decided on a two-month duration to implement the educational program. The work was uniform for both the experimental and control groups in terms of procedures and the duration of the instructional unit, with the model being applied only to the experimental group. The control group followed the method used by the teacher. The educational curriculum was implemented starting on February 17, 2023, with one instructional unit per week, totaling eight units according to the lesson schedule. The duration of each instructional unit was 90 minutes. The researcher applied the educational program they prepared under the supervision of the course instructor and the researcher themselves. The educational program included the application of Posner's educational model steps, which are as follows: Presenting a specific situation, a problem, or posing a question. Observing and discussing the answers. Making predictions about the question. Testing and verifying the predictions. Presenting the correct scientific concept. Applying the correct scientific concept. The instructional unit was divided into three sections: The preparatory section: Aims to prepare the body for performing the given skills, including educational atmosphere, general warm-up, specific warm-up, with a duration of 15 minutes .

7.2 The main section

The instructional part 20 minutes, involving detailed explanation of the skill, demonstration by the teacher, presenting ideas, posing problems or making predictions, and testing learners through questioning (Steps 1-2-3-4). The application part: 45 minutes, involving the practice of skills by learners, repeating specific exercises, and continuous monitoring by the teacher, with a total duration of 65 minutes (Steps 5-6). The concluding section: Includes relaxation exercises, entering the sauna, and engaging in a water game for excitement, lasting about 10 minutes.

7.3 Post-Instructional Tests

After the educational program was applied to the members of both the experimental and control groups, the researchers conducted the final tests on April 19, 2023. The researchers ensured the same conditions for the post-instructional tests regarding time, place, and necessary tools. The researchers also filmed the students' 25-meter backstroke test and presented it to experts to determine each learner's grade according to the established swimming performance evaluation criteria.

8. Results

Table 2: Presents the arithmetic mean, standard deviation, and T-value, showing the calculated data for the two research groups.

Variables	Pre-test		Post-test		Value (t) Calculated
	Mean	Standard Deviation	Mean	Standard Deviation	
Body position	11.834	2.222	10.090	2.878	2.375
Leg strokes	12.431	1.990	11.176	2.343	2.677
Arm strokes	18.215	3.231	16.354	4.321	2.442
Breathing	18.215	2.222	16.560	2.545	3.056
Motor coordination	17.783	2.923	15.8855	2.497	2.665
Academic achievement	69.674	3.545	65.750	4.325	4.665

The table value (t) at a significance level of (0.05) and degrees of freedom (40-2). 4-1-2

9. Discussion

The table (2) reveals differences between the test results of the experimental and control groups for the skills (body position, leg strokes, arm strokes, breathing, coordination), and the academic achievement test for both groups. The results show that all differences are significant and in favor of the experimental group, which indicates that the prepared program and the use of educational techniques had a positive impact on teaching backstroke to the experimental group. The researcher attributes the superiority of the experimental group to the effect of Posner's educational model, which helped accelerate the learning process through clarifying concepts, building new correct concepts, linking previous concepts with new ones, and forming a correct cognitive structure. This led to positive results by enabling learners to apply skills and learn more effectively. This confirms the increase in the students' academic achievement level and the experimental group's superiority over the control group by forming a correct cognitive structure and information that was linked to what the learners already knew. (Al-Hermzi) asserts that the teaching process under conceptual change goes through sequential stages to be fruitful and yield clear results, starting with the preparation stage where students are motivated to think about the phenomena that will be explained in the study unit. Then, they move to the presentation stage where scientific concepts are presented to students within a meaningful problem context, and finally, to the application and integration stage where scientific principles are applied to

new phenomena to integrate them into their scientific and personal knowledge. (Mahmoud, 1995) ^[12] cites Novak & Gowin, who believe that concepts play a central role in acquiring and employing knowledge. For meaningful learning to occur, learners must link new concepts with their previous knowledge about the concept. (Shalsh) believes that correction, training, practice, and continuous guidance improve motor coordination. (Ismail Abd Zaid, Firas Ajil) think that true learning is for every learner to have their own meaning about things. Students do not want more content; they want a unique meaning for the things they do. What a good teacher does is understand the importance of forming meaning and providing the necessary environment that consists of the essential elements for creating meaning.

10. Conclusions

The researcher has come to the following conclusions in the study:

- Psychological hesitation has a direct impact on sports performance.
- There is a correlation between psychological hesitation and the identification relationship in the research sample.
- Increasing the psychological factor has an effective impact on the development of football scoring skills.

11. Recommendations

Based on the conclusions reached, the researcher recommends the following:

- Pay attention to the psychological aspect in teaching basic football skills to students of Physical Education and Sports Sciences, especially first-year students.
- Conduct similar research using other methods, such as mental training, for teaching basic football skills.
- Emphasize the psychological aspect in all its facets and characteristics during the performance of training units.
- Give good attention to psychological preparation as it is an important element in the sports preparation phase to achieve good sports results.

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