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EDUCATIONAL UNITS WERE INFLUENCED BY TOOLS THAT AID IN TEACHING STUDENTS FREESTYLE SWIMMING

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ABSTRACT

This research aims to identify the impact of assistive learning modules on the learning of freestyle swimming skills among first-year students at the Faculty of Physical Education and Sports Sciences. This skill is of great importance in developing students' physical, motor, and psychological aspects, as well as its role in enhancing self-confidence and the ability to adapt to the aquatic environment. The researcher used an experimental design with two equivalent groups (experimental and control) using pre- and post-tests. The research sample consisted of 30 first-year students from Future University – Faculty of Physical Education and Sports Sciences, divided equally into two groups: an experimental group that participated in assistive learning modules, and a control group that studied using the traditional method. The learning modules included a set of exercises and organized activities using various assistive devices, such as buoyancy boards, fins, breathing apparatus, resistance bands, and other educational aids. They focused on teaching the fundamental skills of freestyle swimming, namely: breathing, buoyancy, gliding, arm movement, leg movement, and freestyle swimming technique. The experiment lasted for five weeks, with two instructional sessions per week. The results showed statistically significant differences between the pre- and post-tests, favoring the experimental group in all freestyle swimming skills tests. The experimental group also outperformed the control group in the post-tests, demonstrating the effectiveness of the instructional sessions supported by assistive devices compared to the traditional method. Furthermore, the use of assistive devices contributed to accelerating the learning process, improving motor performance, and reducing students' anxiety. The researcher concluded that instructional sessions designed using assistive devices are an effective teaching method for learning freestyle swimming. This is because they provide a safe, engaging, and stimulating learning environment that considers individual student differences and helps connect theoretical and practical aspects. The research recommends adopting these sessions in swimming programs within educational institutions, providing modern assistive devices, and training teachers in their use. It also recommends conducting future studies that include other swimming skills and different age groups.

KEYWORDS: *Educational, influenced, teaching, freestyle, swimming.*

INTRODUCTION

Freestyle swimming is one of the most important motor skills contributing to students' physical and mental development, due to its positive effects on physical fitness, muscle coordination, mental health, and endurance. Despite its importance, many educational environments face difficulties in effectively conveying motor concepts and skills to learners, due to the inadequacy of traditional teaching methods and the varying levels of comprehension and execution among students.

Recent studies in physical education and the foundations of motor learning have demonstrated that structured learning units supported by modern aids—such as visual aids, simulation models, instructional videos, performance tracking devices, and specialized swimming training equipment—play a pivotal role in accelerating the learning process, enhancing motor understanding, and improving execution levels. This is because these tools connect theoretical knowledge with practical application and provide interactive learning experiences that cater to the individual differences among students.[1]

Integrating well-designed learning units with aids in freestyle swimming training reflects modern educational trends based on the principles of active learning and the use of technology in physical education. This research aims to contribute to understanding the impact of these units and tools on students' learning of freestyle swimming and how to improve teaching and learning in this vital area.

RESEARCH PROBLEM

Despite the availability of swimming programs in educational institutions, many students struggle to acquire freestyle swimming skills, perform them correctly, and are unable to complete them effectively within the allotted time. Some field observations have indicated a limited use of innovative teaching aids in swimming instruction, with teachers relying heavily on traditional methods that lack interaction and motivation.

The core research question is:

To what extent do programmed learning units with assistive tools contribute to improving students' learning of freestyle swimming compared to traditional methods?

STUDY OBJECTIVES

1. Determine the impact of learning units with assistive tools on students' learning of freestyle swimming.
2. Measure the difference in performance between students who learn using learning units supported by assistive tools and students who learn using traditional methods.
3. Identify differences in students' comprehension of motor concepts when using assistive tools.
4. Propose recommendations for developing swimming instruction programs in educational institutions using modern teaching tools.

STUDY HYPOTHESES:

1. Using assistive devices within the learning unit leads to a significant improvement in understanding the motor concepts related to freestyle swimming.
2. Students who learn using assistive devices demonstrate higher motor performance in freestyle swimming compared to students using the traditional method.
3. There is a significant positive correlation between the degree of interaction with assistive devices and the quality of motor performance in freestyle swimming.
4. There is a statistically significant difference between the level of freestyle swimming skill learning among students who learn through educational units with assistive devices and those who learn using traditional methods, in favor of the group that used the assistive devices.

RESEARCH AREAS

- Human Scope: First-year students at Al-Mustaqbal University, College of Physical Education and Sports Sciences, academic year 2025-2026.
- Temporal Scope: From April 12, 2025, to May 17, 2025.
- Spatial Scope: Marina City Indoor Swimming Pool in Babylon Governorate.

RESEARCH METHODOLOGY AND FIELD PROCEDURES

1. RESEARCH METHODOLOGY

Choosing the appropriate methodology for researching any problem is one of the steps that leads to the success of the research. Accordingly, the researcher used the experimental method with the design of two equivalent groups with pre- and post-tests appropriate to the nature of the research and because it is characterized by the accuracy of its results (1). Figure (1) illustrates the experimental design of the research.

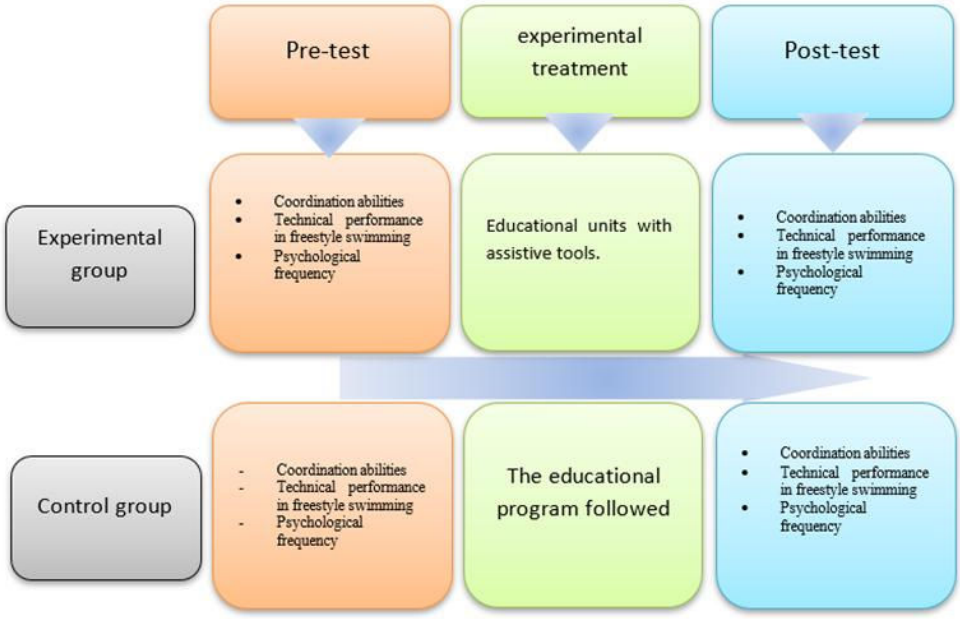

Figure 1. Illustrates the experimental design of the research for the control and experimental groups.

2. RESEARCH POPULATION AND SAMPLE

One of the essential considerations in scientific research is selecting a sample that accurately and truthfully represents the original population. The sample selection process is closely linked to the nature of the research, as the sample represents the portion that constitutes the original population or the model upon which the researcher's work is based (1).

Based on this, the research population was defined as first-year students at Al-Mustaqbal University, College of Physical Education and Sports Sciences, totaling (430) students. The research samples were selected from this population and divided as follows:

FIRST: THE PILOT STUDY SAMPLE

The pilot study sample consisted of (5) first-year students from Al-Mustaqbal University, College of Physical Education and Sports Sciences. This sample was randomly drawn from the research population,[2] representing (1.163%) of the total research population. As shown in Table (1).

SECOND: THE APPLICATION SAMPLE (MAIN)

The application sample – the main experiment – consisted of (30) first-year students from Al-Mustaqbal University – Faculty of Physical Education and Sports Sciences, representing (6.977%) of the total student population (research population). They were divided equally into two groups: experimental and control, each group comprising (15) students.

3. METHODS, DEVICES, AND TOOLS USED IN THE RESEARCH:

Research tools are the means by which the researcher can collect data and solve their problem to achieve the research objectives, regardless of the type of data or devices used (1). The researcher utilized the following methods, devices, and equipment to help in reaching the research results:

FIRST: DATA COLLECTION METHODS:

1. Personal Interviews.
2. Observation.
3. Questionnaires.
4. Testing and Measurement.
5. Sources and References.

SECOND: DEVICES AND TOOLS USED:

1. A Chinese-made HP laptop. 2. Medical scale for weighing.
2. Camera (1).
3. Electronic stopwatch (2).
4. Measuring tape (25m).
5. Swimming goggles (15).
6. Whistle (1).
7. Floating water shorts (15).
8. Snorkel masks (15).
9. Float boards (15).
10. Snorkels (15).
11. Short fins (15).

12. Intensive ropes (15).
13. Medicine balls (large and small) (15).

4. FIELD RESEARCH PROCEDURES

1. FREESTYLE SWIMMING TESTS

- **IDENTIFYING SKILL TESTS**

- Freestyle Swimming Performance Level Tests (1)

To ensure objectivity in assigning appropriate performance scores, and after reviewing Arabic and foreign sources related to measuring the level of learning basic swimming skills, the researcher selected (6) tests to measure the level of learning of basic skills among the research sample and how to evaluate performance levels (breathing test, buoyancy test, flow test, leg test, arm test, and freestyle swimming test) during the freestyle swimming event.[3]

FIRST: BREATHING TEST[4]

- Test Name: Breathing
- Test Objective: To determine the ability to regulate the breathing process.
- Test Equipment: Swimming pool, stopwatch, whistle, and registration form. Test Description: The subject stands facing the wall of the tank, one leg in front of the other. The torso bends forward and downwards until it is at water level. One arm grips the tank wall while the palm of the other hand rests on the wall approximately 10-15 cm below the water's surface. After the start signal, the subject inhales through the mouth and submerges their head, attempting to remain submerged for as long as possible while keeping their eyes open.
- Test Recording: The test is recorded from the start signal until the subject's head emerges from the water, with the time measured in seconds. Figure (2) illustrates this.

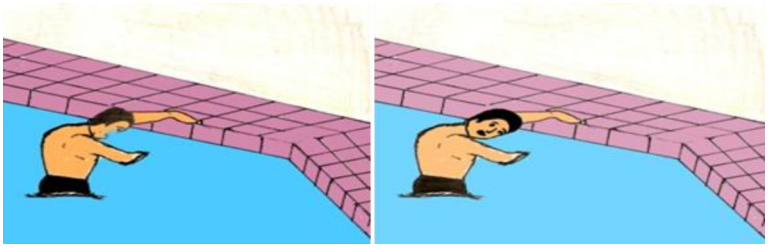

Figure 2. Illustrates the Breathing Skills Test

SECOND: BUOYANCY TEST [5]

- Test Objective: To measure the learner's ability to float.
- Test Materials: Swimming pool, stopwatch, whistle, recording form.
- Test Description: The learner begins from a standing position in the water. The learner floats by leaning forward, extending the arms forward, raising the legs backward, and floating on their stomach until the body is in a straight line with the arms and legs extended to the sides.
- Test Recording: The test is measured when the learner hears the starting whistle. The learner assumes a horizontal, forward position until the body is leaning. The time spent floating is recorded in seconds and fractions thereof. Figure (3) illustrates this.

Figure 3. illustrates the buoyancy test

THIRD: THE FLOW TEST[6]

- Test Name - Flow (1):
- Purpose of the test: To assess the body's ability to remain balanced on the water's surface without tilting, demonstrating dynamic coordination.
- Test Equipment: Swimming pool, measuring tape, recording form, whistle.

- Test performance: The distance is marked with adhesive tape on the inner edge of the swimming pool with three marks: the first at a distance of (3m), the second at a distance of (6m), and the third at a distance of (10m). The subject stands with their back parallel to the inner edge of the pool, with the palm of one foot on the pool wall and the knee pointing forward. The other foot is resting on the bottom of the pool, with both arms raised and the head between the arms. The subject inhales and holds the breath, then bends the torso forward. The subject pushes against the pool wall with the palm of the supported foot, looking forward, ensuring that the eyes remain open throughout the performance. The subject's performance is evaluated based on the distance covered, and a score is given for correctly performing the flow for a distance of (10m) or less (1-10). Figure (4) illustrates this.

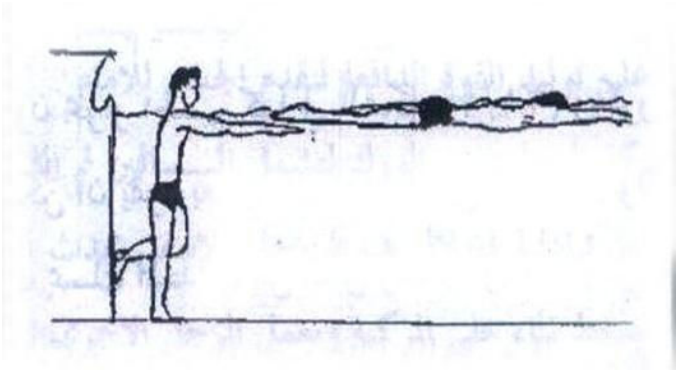

Figure 4. Illustrates the Glide Test

FOURTH: LEG MOVEMENT TEST

- Test Name: Leg Movement
- Test Objective: To measure the distance traveled by the subject while performing the leg movement with breathing using a flotation board.
- Test Equipment: Swimming pool, flotation board, measuring tape, recording form, whistle.
- Test Description: The subject stands in the pool, back to the edge, holding the flotation board with both hands and arms extended forward. One leg is straight with the foot on the ground, while the other leg is bent at the knee with the foot resting against the pool wall. Upon hearing the start signal, the subject bends their torso, pushes against the wall with the bent leg, glides forward, and performs the leg movement with breathing.
- Test Recording: The test is recorded by measuring the distance from the edge of the pool until the subject stands on their feet. Figure (5) illustrates this.

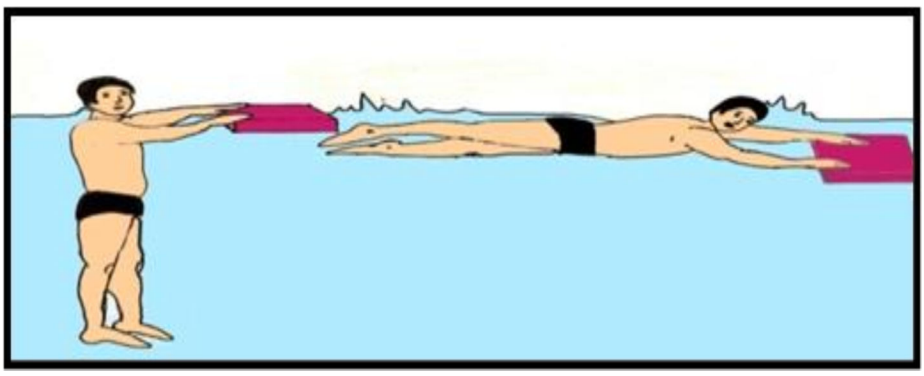

Figure 5. Illustrates the Leg Skills Test

FIFTH: ARM MOVEMENT TEST[7]

- Test Name: Arm Movement
- Test Objective: To measure the distance covered by the subject while performing arm movements with breathing using a pull-boy.
- Test Equipment: Swimming pool, float board, measuring tape, recording form, whistle.
- Test Description: The subject stands in the pool with their back to the edge, securing the float board between their thighs. Upon hearing the start signal, the subject pushes against the wall with one leg, glides over the water's surface, and performs the arm movements with breathing.

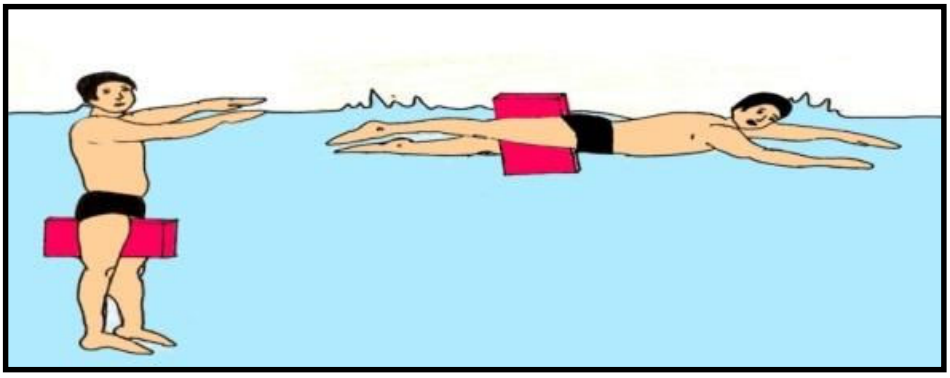

Figure 6. Illustrates the Arm Movement Test

- Test Recording: The test is recorded by calculating the distance covered from the pool edge until the subject is standing on their feet. Figure (6) illustrates this.

SIXTH: FREESTYLE SWIMMING EFFECTIVENESS TEST[8]

- Test Name: Freestyle Swimming (1)
- Test Objective: To perform the freestyle swim for the longest possible distance.
- Test Equipment: Swimming pool, measuring tape, scoring form, whistle.
- Test Description: The subject stands in the pool with their back against the edge. One leg is straight with the foot on the ground, while the other leg is bent at the knee with the foot resting on the pool wall. Upon hearing the start signal, the subject pushes off the wall with the foot resting on the edge and performs the freestyle swim for the longest possible distance using the best technique.
- Test Recording: The test is recorded by measuring the distance from the pool wall to where the subject stands. Figure (7) illustrates this.

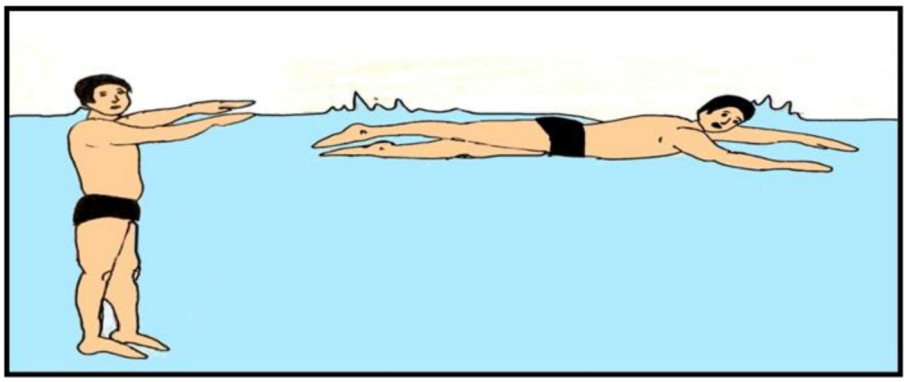

Figure 7. Illustrates the freestyle swimming test

5. MAIN RESEARCH PROCEDURES

- **PILOT TEST**

The pilot test is one of the most important procedures a researcher undertakes before conducting the final experiment. Its purpose is to test research methods and tools and to identify the requirements for accurate and correct work, free from difficulties. The pilot test serves as "practical training for the researcher to personally observe the strengths and weaknesses encountered during the testing process, in order to avoid them in the future."[9]

The researcher conducted the pilot test on Thursday, March 13, 2025, with a sample of (3) students from the target population. The researcher aimed to achieve the following through this pilot test:

1- Identify potential obstacles that might hinder the field experiment.

2- Confirm the ability of the assigned support team to understand and implement the required tests.

3- Identify the need for other necessary resources.

4- The student will be able to administer the tests.

PRE-TESTS

Pre-tests were administered to the experimental and control groups on Tuesday, March 18, 2025, at 9:00 AM. The tests included the Psychological Frequency Scale, Adaptive Abilities Tests, and a swimming test at the Marina Al-Ahli Indoor

Swimming Pool. The pre-tests were administered with the assistance of the support team after they received two introductory modules.

HOMOGENEITY AND EQUIVALENCE

To control for certain variables that affect the accuracy of the research results and to attribute any differences in effect solely to the independent variable, the Leven rank correlation coefficient was used for homogeneity, and the independent samples t-test was used to ensure equivalence between the two groups, as shown in Table 1.

Table 1. Show Homogeneous

Statistical methods	Age (years)	Length (cm)	Weight (kg)	Statistical significance
Median	21	172,00	66,30	Homogeneous
mean	21,51	171,32	67.5	Homogeneous
Standard deviation	0,90	5,58	5,05	Homogeneous
Skewing coefficient	−0,0	0,042	0,544	Homogeneous

Table 2. shows the homogeneity and equivalence of the two research groups in the variables under study

Variables	Units	Control group		Experimental group		Calculated value of t	Level of significance Sig.	Type of indication
		Mean	Std	Mean	Std			
Buoyancy	Second	6	0.894	5.9	2.29	1.49	0.568	Non-Sig.
Floating	Meter	3.18	0.88	3.63	0.41	1.66	0.342	Non-Sig.
Arm movement	Meter	4.29	0.56	4.40	0.67	1.39	0.471	Non-Sig.
Leg movement	Meter	5.01	0.89	4.41	9.65	0.42	0.893	Non-Sig.
Breathing	Second	4.40	0.67	3.40	0.64	0.53	1.342	Non-Sig.

MAIN EXPERIMENT

The training units were implemented from Saturday, April 12, 2025, to Saturday, May 17, 2025, for five weeks, with two training units per week on Saturdays and Tuesdays. The units covered six essential skills for learning freestyle swimming: breathing test, buoyancy test, glide test, leg test, arm test, and freestyle test, as well as some coordination skills.

A- Preparatory Section: 15 minutes, including changing into regular clothes, taking attendance, and then general and specific warm-up exercises. A safety lesson was then given before entering the swimming pool.

B- Main Section: 60 minutes, including an explanation and demonstration of how to apply the specific skill. This was divided into 15 minutes outside the pool and 45 minutes inside the pool.

C- Concluding Section: 15 minutes (recreational game, relaxation, cool-down, then dismissal). 3-5 Post-Tests

Post-tests were conducted for both the experimental and control groups on Tuesday, May 17, 2025, for the Psychological Frequency Scale, some adaptive abilities, and freestyle swimming. The researcher ensured that the same procedures and similar conditions were followed in all tests and provided the appropriate tools.

6. STATISTICAL METHODS

The researcher used the Statistical Package for the Social Sciences (SPSS) to process the data. The package was used in the following sections.

RESULTS AND DISCUSSIONS

- **PRESENTATION AND ANALYSIS OF THE PRE- AND POST-TEST RESULTS IN PSYCHOLOGICAL FREQUENCY, ADAPTIVE ABILITIES, AND SWIMMING TESTS FOR THE EXPERIMENTAL GROUP:**

Table 3. Shows the means, standard deviations, and t-value for the pre- and post-test results in psychological frequency, adaptive abilities, and swimming tests for the experimental group

Variables	Units	Pre-test		Post-test		Calculated t value	Value sig	Type of indication
		Mean	Std	Mean	Std			
Buoyancy	Second	0.84	12.10	1.370	14.33	3.83	0.00	Sig.
Arm movement	Meter and its subdivisions	4.29	0.56	8.44	0.46	8.10	0.00	Sig.
Leg movement	Meter and its subdivisions	5.01	0.89	7.38	0.68	11.12	0.00	Sig.
Glide	Meter and its subdivisions	3.18	0.88	6.33	0.55	8.13	0.00	Sig.
Breathing	Second	4.40	0.67	27.44	1.12	13.78	0.00	Sig.

The results of this research demonstrated the effectiveness of educational units designed using assistive tools in achieving three interconnected objectives: developing certain coordination skills, learning freestyle swimming, and reducing psychological hesitation among students at Future University's Faculty of Physical Education and Sports Sciences. These results reflect the integration of physical, mental, and psychological aspects within the educational environment, indicating that successful sports education can only be achieved by considering all these dimensions together, according to a comprehensive, modern scientific perspective.

The design of the educational units in this research relied on the use of assistive educational tools such as balls, resistance bands, and boards. These tools were not merely aids but active elements in guiding movement and stimulating students' mental and emotional processes, especially since the aquatic environment represents a new and unsettling setting for beginners. The variety of these tools helped increase coordination between skills, enhance enjoyment, and promote positive engagement in the activity—essential conditions for overcoming students' feelings of psychological hesitation. It can be said that the interconnected effect of the tools used was clearly evident in reducing hesitation levels, especially given the students' reported feelings of fear of the aquatic environment, poor performance, or apprehension about the new water environment. All of these were addressed educationally and psychologically by creating an engaging, safe, and flexible learning environment. Throp, Bunker, and Almond (1996) indicated that learning through play not only reduces hesitation but also enhances motivation and accelerates skill acquisition.[10]

This is reinforced by Arnold's (1981) emphasis on the necessity of designing learning units in an environment similar to real-life performance conditions to ensure the transfer of learning and the consolidation of skills in motor memory. Furthermore, the researcher's reliance on the systematic repetition of movements using the tools helped strengthen neural connections and stimulate correct motor responses. This is supported by Ya'rub Khayoun, who states that frequent repetition of a specific response accelerates decision-making and shortens reaction time.[11]

Therefore, the educational units designed with assistive tools were not merely an educational means, but rather formed an integrated environment that addressed psychological problems, developed adaptive aspects, accelerated the process of acquiring skills, and provided students with the opportunity to learn in an atmosphere of fun and positive interaction, reflecting the importance of educational planning based on comprehensive scientific foundations.

- **PRESENTS AND ANALYZES THE RESULTS OF THE PRE- AND POST-TESTS IN PSYCHOLOGICAL FREQUENCY, ADAPTIVE ABILITIES, AND SWIMMING TESTS FOR THE CONTROL GROUP.**

Table 4. shows the means, standard deviations, and t-values for the pre- and post-test results in psychological frequency, adaptive abilities, and swimming tests for the control group

Variables	Units	Pre-test		Post-test		Calculated t value	Value sig	Type of indication
		Mean	Std	Mean	Std			
Buoyancy	Second	1.08	10.60	1.173	11.13	2.83	0.00	Sig.
Arm movement	Meter and its subdivisions	4.40	0.67	6.36	0.51	6.69	0.00	Sig.
Leg movement	Meter and its subdivisions	4.41	9.65	6.88	0.61	10.85	0.00	Sig.
Glide	Meter and its subdivisions	3.63	0.41	4.51	0.44	6.65	0.00	Sig.
Breathing	Second	3.40	0.64	21.10	1.64	12.20	0.00	Sig.

Looking at the performance of the control group, we find that they also showed some improvement in the three variables. This reflects the teacher's effort in delivering the educational content within the available resources, while adhering to the educational plan approved by the institution. The teacher relied on a direct approach to explanation and guidance, focusing on clarifying basic movements and safety principles in the aquatic environment. This contributed to some progress in the students' swimming skills, as well as improving some of their general coordination abilities. Furthermore, the teacher's commitment to providing psychological support and encouragement to the students during the lesson helped to reduce their level of anxiety to a certain extent.[12]

However, this improvement, despite its importance, did not reach the level achieved by the experimental group, which underwent carefully planned educational units that relied on the gradual presentation of skills, the use of assistive tools, and the employment of stimulating educational methods that integrate the psychological and motor aspects more deeply and effectively. This difference is attributed to the fact that traditional methods, despite the teacher's efforts, lack the elements of excitement, enjoyment, and multiple sensory experiences provided by the tools used, and they do not give the learner enough opportunity for self-empowerment and gaining confidence within educational situations.

- **PRESENTATION AND ANALYSIS OF THE POST-TEST RESULTS FOR THE CONTROL AND EXPERIMENTAL GROUPS IN PSYCHOLOGICAL FREQUENCY, ADAPTIVE ABILITIES, AND SWIMMING TESTS.**

Table 5. Shows the means, standard deviations, and t-value for the post-test results in psychological frequency, adaptive abilities, and swimming tests for the control and experimental groups

Variables	Units	Control group		Experimental group		Calculated t value	Value sig	Type of indication
		Mean	Std	Mean	Std			
Buoyancy	Second	1.173	11.13	1.370	14.33	2.69	0.00	Sig.
Arm movement	The meter and its parts	6.36	0.51	8.44	0.46	11.19	0.00	Sig.
Leg movement	The meter and its parts	6.88	0.61	7.38	0.68	9.12	0.00	Sig.
Glide	The meter and its parts	4.51	0.44	6.33	0.55	7.11	0.00	Sig.
Breathing	Second	21.10	1.64	27.44	1.12	12.19	0.00	Sig.
Freestyle swimming	The meter and its parts	5.40	0.96	7	0.77	4	0.00	Sig.

This aligns with modern trends in motor education and swimming, which emphasize the importance of incorporating assistive learning tools as an effective method for facilitating the learning process, especially in complex skills or environments requiring special handling, such as the aquatic environment. Evidence has shown that using these tools not only accelerates learning but also reduces anxiety, builds self-confidence, and facilitates the gradual progression of skill performance—factors that were not adequately present in the traditional program implemented with the control group.

At the same time, the role of the teacher in the control group cannot be underestimated. They demonstrated dedication to their duties and made personal efforts to motivate and empower the students. However, the limited traditional learning environment was insufficient to provide the multidimensional support needed to achieve significant learning breakthroughs.[13] This underscores that the excellence achieved in the experimental group is not solely attributable to the implemented strategy, but also to its integration with interactive teaching methods, a variety of educational tools, and the application of a comprehensive curriculum that addresses both psychological and motor aspects simultaneously. Therefore, it can be said that the clear differences in performance between the two groups do not reflect weaknesses in the teaching of the control group or shortcomings in the teacher's performance. Rather, they highlight the gap between limited traditional education and modern, tool-based, and interactive methods. This necessitates a review and development of the adopted curricula and teaching methods to align with the nature of the skills to be taught and the students' psychological and skill-based needs in specific environments such as swimming.

CONCLUSIONS

1. The educational units supported by assistive tools proved to be clearly effective in learning freestyle swimming compared to the traditional method, as they significantly improved students' motor performance.
2. The use of assistive tools played a positive role in accelerating the learning process and reducing the time required to master freestyle swimming skills by facilitating the understanding of the correct performance phases.
3. The organized educational units contributed to increasing students' motivation to learn and raising the level of interaction within the educational unit, which positively impacted the level of comprehension and practical application.
4. The results showed that students who used assistive devices were better able to correct their motor errors compared to their peers who learned using traditional methods.
5. The variety of assistive devices (visual and practical) helped to accommodate individual differences among students, leading to improved learning levels for most participants.
6. The study demonstrated that linking theory and practice using assistive devices contributed to developing a correct motor understanding of freestyle swimming.

RECOMMENDATIONS

1. Adopting assistive learning units in freestyle swimming programs within educational institutions, given their positive impact on improving learning levels.
2. Providing modern swimming instructional aids (such as buoyancy boards, buoyancy tubes, instructional videos, and model swims) in training pools.
3. Training physical education teachers and swimming coaches on the systematic and scientific use of assistive devices within instructional units.
4. Revising swimming curricula and incorporating modern teaching methods based on active learning and educational technologies.
5. Conduct similar studies on other swimming skills (such as backstroke, breaststroke, and butterfly) and on different age groups to verify the effectiveness of training units supported by assistive devices.
6. Encourage researchers to study the impact of different types of assistive devices and determine which are most effective in learning swimming skills.
7. Consider individual differences among students when designing training units and selecting appropriate assistive devices for each level.

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