

Effect of Mind Maps Strategy on Performance in Air Rifle Shooting

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Abstract

To shift students from traditional learning frameworks to new ones that grant them a positive role in the educational process, it is essential to use strategies and plans that help reveal their potential, abilities, inclinations, and orientations. This is achieved by giving students a degree of freedom and independence, instead of the teacher being the sole leader and decision-maker.

From this perspective, the researcher decided to use the mind maps strategy as a means to facilitate the learning process, save time and effort for the teacher, and enable the student to take responsibility, becoming a researcher, innovator, and discoverer capable of finding solutions to any problem through positive response and reaction. The effectiveness of shooting is distinct from other sports, as it requires high concentration, accuracy, quick wit, rapid analysis, studying surrounding conditions, and then choosing the appropriate decision within a limited time.

The study utilized an experimental method with pre- and post-tests on a sample of second-year male students who regularly attend shooting classes at the College of Physical Education and Sports Sciences for Boys. After performing the pre-test to ensure equivalence, and conducting the main experiment and post-tests, the researcher found that students who studied according to the mind maps strategy achieved a higher learning rate than the control group, which studied according to the traditional method. Therefore, the researcher recommended the necessity of using means and strategies that give the learner a positive role in participating in the educational process, considering them the core of this process.

Keywords:

Teaching methods, Shooting.



1. Research Introduction

1.1. Introduction, Importance, and Research Problem

Sport is one of the most important components of modern society and a fundamental pillar of its development. Therefore, modern societies have paid great attention to it by conducting research in various fields, including teaching methods research that keeps pace with technological development. This research contributes to finding strategies and plans that enable the teacher to bear responsibility as the primary person responsible for delivering a successful practical lesson according to advanced foundations and mechanisms. For a teacher to be successful and competent, they must continuously keep pace with this development by using means and strategies that enable the learner to understand and assimilate the educational material on one hand, and facilitate the teacher's work in terms of saving effort and time on the other.

This is especially true if the educational tool engages the learner's mind and thinking, such as mind maps. The effectiveness of shooting has its own specificity, as it is one of the sports closely linked to mental processes, requiring quick wit, concentration, and the ability to analyze quickly by studying surrounding conditions, then choosing the appropriate and correct decision in a short period after shooting and achieving stability, which is a fraction of a second. Therefore, it is necessary to make the decision to aim at the target with high accuracy and smooth trigger pull, and this can only be achieved through learning and practice to reach a technical performance that achieves the desired goal. By employing the mind maps strategy, it is possible to contribute to learning this skill and obtaining good technique in a new and innovative way.

Mind maps are educational tools that help convey certain information and ideas after being formulated into a mind map by the learner. This process relies



on the student and their ability to interpret what this map presents as a new concept for them.

Hence, the research problem emerges in a serious and new scientific and practical attempt in this field to identify the effect of the mind maps strategy on the technical performance of air rifle shooting skill. This is because it provides the learner with an opportunity for effective participation in the educational process through the formation of these maps that serve the skill. Thus, it moves the learner out of traditional frameworks, such as the command style, to a new strategy that enables the student to take responsibility to be a creative researcher and discoverer capable of finding solutions to any problem through positive response and reaction. A good learner is one who knows how to employ their mind to achieve learning and accomplish tasks to reach the desired goal.

1. 2. Research Objectives

1. To prepare educational units using mind maps for learning air rifle shooting skill.
2. To determine the impact of the mind maps strategy on the technical proficiency in air rifle shooting.

1.3. Research Hypotheses

1. The pre-test results for air rifle shooting technical performance showed no statistically significant disparities between the experimental and control groups
2. The post-test for air rifle shooting technical performance revealed a statistically significant difference in favor of the experimental group, with no such difference observed in the control group.

2. Research Methodology and Field Procedures

2.1. Research Methodology



Selecting the appropriate methodology is one of the steps upon which the success of the research depends, as research relies on the nature of the problem and the objective to be achieved. Therefore, the researcher used the experimental method with the equivalent groups approach to address the research problem, as it is the most suitable for the nature of the research.

2.2. Research Sample:

The study's main sample consisted of 30 second-year male students from the College of Physical Education and Sports Sciences at the University of Babylon for the 2024-2025 academic year. These students were divided into two equal groups of 15: Section C, randomly chosen as the experimental group, and Section B, which served as the control group. The sample was considered homogeneous as all students were at the same academic level and had no prior shooting experience.

Table (1)

Displays the arithmetic means, standard deviations, and calculated and tabular T-values for the experimental and control groups' pre-test technical performance in air rifle shooting, for equivalence purposes..

Groups	Arithmetic Means	Standard Deviations	Calculated T Value	T Value	Degrees of Freedom	Result
Experimental	4.02	0.76	0.169	2.048	28	Random Difference
Control	4.14	0.88				

As indicated in Table 1, the pre-test results for air rifle shooting skill showed no significant difference between the experimental and control groups, thereby confirming their initial equivalence.

2.3. Equipment, Tools, and Information Gathering Methods

2.3.1. Tools and Equipment

1. 5 kg air rifles
2. Regulation targets



3. Target transportation carriers
4. Forms for registration
5. A video camera

2.3.2. Data Collection Methods

1. Review of Arabic and international literature
2. Direct observation and experimental procedures
3. Utilization of the global information network (Internet)

2.4. Data Collection Tools

2.4.1. Correct Shooting Posture Test (Technical Performance) with Dry Firing (without live rounds)

Test Description: The test subject stands on the shooting line. Upon the start signal, the subject holds the weapon and prepares it towards the target, which is 10m away from the shooting line.

Scoring Method:

- (2) points are awarded for foot placement, with the feet spread shoulder-width apart.
- (2) points when the hip and waist area are in the correct position.
- (2) points when the weapon-holding arm is in the correct position.
- (2) points when the rear arm, hand, and index finger are in the correct position.
- (2) points for head and rifle positioning. The total score is (10) points.

Note (1): One attempt is given to each test subject.

2.5. Pilot Study:

The researcher conducted a pilot study on Sunday, November 17, 2024, involving (6) students from the second stage who were selected from the sample. The pilot study is considered a simplified actual test whose purpose is



to overcome obstacles that the researcher may encounter when carrying out the main tests on the research sample. The pilot study revealed the following:

1. Knowledge of the suitability of the weapons and equipment used in the research.
2. Knowledge of the time required for each test subject and the number of necessary attempts.
3. The test subject's ability and readiness to perform the test.
4. Suitability of the assisting work team for performance.

2.6. Field Experiment Procedures include:

2.6.1. Pre-tests

On Wednesday, November 20, 2024, at 10:00 AM, the researcher administered the pre-test in the shooting hall of the College of Physical Education and Sports Sciences at the University of Babylon. Prior to the test, all required supplies and tools were prepared, and the execution procedure, along with the number of attempts per student, was thoroughly explained, how the score would be calculated, and ensuring the smooth flow of work by the researcher, while taking into account the spatial and temporal conditions and the method of test execution.

2.6.2. Main Experiment

After the researcher prepared the educational curriculum according to the mind map strategy for (6) weeks, with (2) educational units per week, the researcher applied the research items according to this strategy. This involved explaining and demonstrating the skill in the educational part, then beginning to ask questions and distributing colored papers and colored pens to the students, allowing each student to choose the color they wished to work with. A homework assignment was also given, where the student would explain what they learned from the teacher on the colored paper, along with an illustrative drawing of the skill's components. This paper or map served as a notebook to



help the student remember what they learned to answer questions posed by the teacher in the next instructional unit. Then, they moved to the practical part and demonstrated the skill. The researcher defined the objective of the educational curriculum, which was to teach the technical performance of air rifle shooting, serving as the basis for evaluation between the experimental and control groups. The evaluation tool used also received expert praise when presented to them.

2.6.3. Post-test

Upon completion of the implementation period for the proposed curriculum, the researcher conducted the post-test on Monday, January 20, 2025, with the assistance of specialized experts in air rifle shooting to arrive at objective results in calculating the final score for the sample individuals.

2.7. Statistical Methods

Statistical methods were used to process the test results, including:

- First: Arithmetic mean.
- Second: Standard deviation.
- Third: Pearson correlation coefficient.
- Fourth: T-test.

3. Results: Presentation, Analysis, and Discussion

This section presents and analyzes the results to determine the **effectiveness of the proposed program** on the **technical performance of air rifle shooting skill** within the experimental group, thereby evaluating the research hypothesis. **Statistical methods** appropriate for the study's design were applied to both pre- and post-test data, yielding the following outcomes:



3.1. Research Groups' Technical Performance: Results and Analysis

Table No. (2)

Shows the values of the arithmetic mean, standard deviation, and calculated and tabular (T) values in the post-test for research groups in the level of technical performance of air rifle shooting skill.

Groups	Arithmetic Means	Standard Deviations	Calculated T Value	Tabular T	Degrees of Freedom	Result
Experimental	7.021	1.66	3.022	2.048	28	Significant Difference
Control	6.121	1.22				

Table 2 clearly shows that the post-test results for air rifle shooting skill revealed a highly significant difference, favoring the experimental group's technical performance. The experimental group had an arithmetic mean of 7.021 (SD = 1.66), while the control group's mean was 6.121 (SD = 1.22). The calculated T-value of 3.022 exceeded the tabular value of 2.048 (df = 28, $p < 0.05$), confirming a significant difference in favor of the experimental group.

3.2. Discussion of Results

In light of the statistical analyses of the research results, Table No. (1) shows no statistically significant differences between the arithmetic means in the technical performance results of the skill in the pre-test, which indicates the equivalence of the sample individuals.

Table 2 reveals significant differences in the arithmetic means of technical performance test results for air rifle shooting, with the experimental group outperforming the control group. This suggests the mind map strategy led to improved performance.

Consequently, the null hypothesis (positing no statistically significant difference in post-test technical performance between the two groups) is rejected. The alternative hypothesis, which affirms a statistically significant difference favoring the experimental group, is accepted. The researcher



attributes this outcome to the positive influence of the mind map strategy on enhancing technical learning in air rifle shooting.

As indicated by (Khair Allah Suleiman - 2010), mind maps are a tool that aids in planning, learning, and constructive thinking by relying on drawing and writing everything we want on a single sheet of paper in an organized manner. This helps the learner to concentrate and remember by combining concise written aspects with a few words and the practical aspect. This enables the learner to link the desired information to a specific drawing (2: 209). This strategy itself is considered a creative map that represents the student's vision of the study material or information about the skill to be learned, along with the relationships and links they establish themselves between parts of the material or skill. In other words, it consists of special notes and memos and is not just about taking notes (1: 76).

These written notes served as a notebook for the student to use when needed, which helped in recall and accelerated the learning process through participation in designing mind maps. This, in turn, increased the student's self-confidence and improved their technical performance in air rifle shooting. It also aided in their learning of this activity by engaging their mind and thoughts, making them creative, researchers, and discoverers.

4. Conclusions and Recommendations

4.1. Conclusions In light of the research test results and their discussion, the following conclusions were reached:

First: The research groups (control and experimental) achieved positive learning outcomes in air rifle shooting.

Second: The experimental group, which studied air rifle shooting according to the mind map strategy, achieved better learning than the control group.



4.2. Recommendations

1. The necessity of diversifying the use of strategies that serve the effectiveness of shooting and work to develop and raise the learning ability for optimal performance of skills.
2. The necessity of using tools and strategies that give the learner a positive role, considering them the focal point of the educational process.
3. The physical education teacher should keep pace with technological development to be able to deliver a successful practical lesson based on advanced foundations and mechanisms that enable the learner to understand and comprehend the educational material.

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