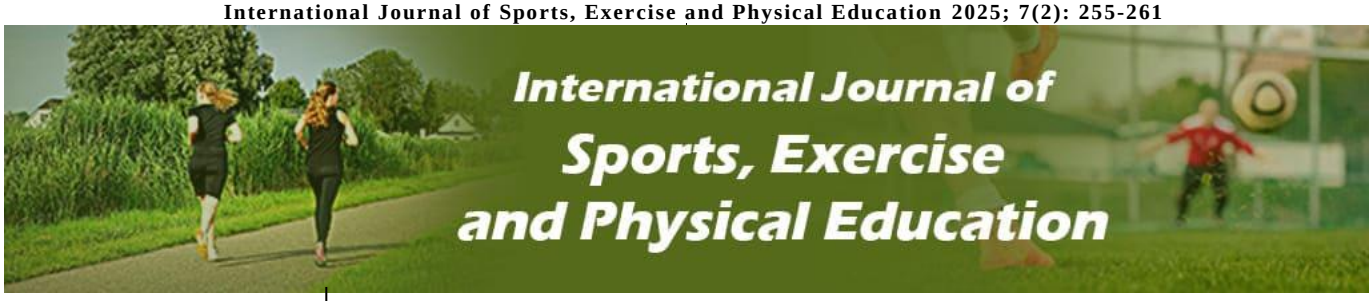

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The effect of the two methods of scheduling practice accompanied by mental training on learning technical performance and the level of achievement in throwing

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Abstract
The present study aims to design training exercises intended to enhance both the learning of technical performance and the achievement level in javelin throwing through the application of fixed and variable practice schedules combined with mental training. This topic is of particular significance within the field of motor learning for sports skills, as mental training contributes positively to the visualization and mental representation of movement patterns. The primary objective of the study is to determine which of these two practice approaches fixed or variable practice, when paired with mental training produces superior outcomes in the acquisition of technical performance and achievement.
The research problem is framed by the following central question:

- Does the use of fixed and variable practice methods in conjunction with mental training lead to more favorable results in technical performance and achievement?

The specific objectives of the study are twofold. First, to examine the impact of an instructional program based on fixed and variable practice schedules, each accompanied by mental training, on the learning of javelin throwing technique and achievement among two experimental groups. Second, to compare the post-test results of the two experimental groups to identify differences in the effectiveness of fixed practice with mental training versus variable practice with mental training. An experimental methodology was employed to suit the nature of the investigation. The research population consisted of first-year students enrolled in the College of Physical Education and Sports Sciences at the University of Kirkuk during the 2024-2025 academic year, totaling 320 students across three classes. The study sample was purposefully selected from two of these classes (excluding the female students' class) to form the two experimental groups, resulting in a total of 115 male participants. Students were randomly assigned to the groups, with a small number excluded to ensure equivalence between them. The research utilized a randomized equivalent-groups design incorporating both pre- and post-tests. Data were analyzed using the Statistical Package for the Social Sciences (SPSS).

Keywords: Practice scheduling, mental training, performance learning, achievement level, javelin throwing

Introduction
Learning is considered one of the most important sectors that contributes to the development of educational processes. This development is achieved through the results of research and studies conducted by researchers, each according to their scientific specialization in the field of sports. This will lead to improved performance and the elevation of athletic achievements to the highest levels, as the primary goal is to learn proper technical performance.
One of the most important goals sought by teachers is to improve the quality of training. Therefore, training is of great importance in preparing learners physically, mentally, and motor-wise in various sports. Track and field events (athletics) are the most popular events in the world because they are closest to human movement, as every human being needs to walk, run, throw, jump, and leap. The javelin throw is also one of the basic events in athletics, through which students can achieve new accomplishments and records by throwing the javelin to the farthest possible distance. The effectiveness of javelin throw will be addressed in this study by scheduling practice in its fixed and variable aspects, based on the physical and motor abilities it requires, and the artistry and aesthetics of its performance. As we can point out, the use of mental training in sports movements and the possibility of using it in

developing motor programs, it is therefore necessary to pay attention to educational units and the various exercises they contain, aiming to learn technical performance, including repetitions of physical exercises and rest between them. All of these exercises are based on scientific foundations in terms of the nature of performance. To control all activities within educational units, practice scheduling emerged, providing researchers with diverse methods for learning technical performance for various sports skills. Therefore, "the process of organizing training is one of the necessary and important aspects of the educational process, as it contributes to achieving diversity in the exercises used and the methods of implementing them, in addition to facilitating the process of learning the skill, taking into account the difficulty or ease of the skill to be learned through gradual progression" (Ghafoor and Nouri, 2024, 303-305) [1]. Practice scheduling (training) has been classified according to scientific sources into several categories, including (static training and variable training) (Khayoun, 2002, 80-85) [6] and (Ghafoor and Nouri, 2024, 305) [1]. It is possible to use more than one exercise. It can be summarized that preparing exercises that work in the field of learning technical performance in javelin throwing by using fixed and variable practice schedules accompanied by mental training, which is one of the important matters in the field of motor learning of sports skills in general, due to its positive role in visualizing the motor form of the skill with the aim of identifying which of them gives better results in learning technical performance and improving the level of achievement in most studies, and this is what was indicated by (Ghafoor and Nouri, 2024) [1].

Research Problem

Through the researchers' knowledge and field experience as instructors of practical lessons, and given that there is a specialist in teaching athletics and its activities, including the javelin throw, they found a delay in achieving good performance according to the established method and program. Therefore, the researchers developed an idea to use scheduling practice using both fixed and variable methods, along with mental training, which is an important foundation that facilitates the learning process. Furthermore, the researchers did not find a program that had been employed to schedule fixed and variable practice, accompanied by mental training, with the javelin throw activity. This has not been previously addressed in learning technical performance in athletics activities in general, and javelin throw in particular. Therefore, the researchers sought to conduct such a study.

Hence, the research problem lies in answering the following question:

- Will using fixed and variable practice methods, accompanied by mental training, yield better positive results?

Research objectives

1. To investigate the effect of the educational program for (fixed) and (variable) practice scheduling accompanied by mental training on learning technical performance and achievement levels in javelin throwing for the two experimental groups.
2. To compare the post-test of the educational program for (fixed) and (variable) practice scheduling accompanied by mental training on learning technical performance and achievement levels in javelin throwing for the two groups.

Research hypotheses

1. There are significant differences between the pre- and post-tests of the educational program that includes (fixed) and (variable) practice scheduling accompanied by mental training on learning technical performance and achievement levels in javelin throwing, in favor of the post-test.
2. There are significant differences in the post-test for the two research groups on learning technical performance and achievement levels in javelin throwing.

Research Areas

- **Human Area:** First-term students at the College of Physical Education and Sports Sciences, University of Kirkuk.
- **Time Area:** From January 5, 2024 to February 13, 2025.
- **Spatial Area:** College of Physical Education and Sports Sciences Stadium, University of Kirkuk.

Methodology

The experimental method was used due to its suitability for the nature of the research.

Research Population and Sample

The research population consisted of first-year students at the College of Physical Education and Sports Science at the University of Kirkuk for the academic year 2024-2025. The sample consisted of (320) students, distributed among (3) classes, who were intentionally selected. A sample was selected from two of the (3) classes after excluding the female students' class and the classes representing the two experimental groups, totaling (115) students from classes (B and C). They were distributed randomly. A number of students were also excluded due to inequality with the rest of the sample for the following reasons:

a) Students with experience and practice in the activity.
b) Students who had failed a year.
c) Absentee students who did not attend the pre-test (photography of the artistic performance).
d) Students who were absent for more than two lectures during the implementation of the main experiment.

Thus, the final sample size was (34) students, representing (29.565%) of the original population of male students only, distributed as (17) students per class.

Experimental Design

The researchers used an experimental design called a randomly selected equivalent group design with pre- and post-tests.

- Pre-test for the two experimental groups (technical performance and achievement level in javelin throwing).
- Independent variable (fixed and variable practice scheduling methods accompanied by mental training).
- Post-test for the two experimental groups (technical performance and achievement level in javelin throwing).

Data Collection Methods

Questionnaire: A questionnaire to determine the grades of the apparent motor construction sections for technical performance in javelin throwing. The researchers designed a form to determine the grades of the apparent motor construction sections for technical performance, which was distributed to some specialists in (motor learning and athletics). This was done in order to determine the grades of the apparent motor construction sections, which include (the preparatory section, the main section, and the final section). The total grade should be (100), with the grade of each section distributed among the parts it contains. After collecting and transcribing the questionnaires, the researchers obtained a percentage of agreement among the specialists that amounted to between (75% - 100%), as shown in Table (1).

Table 1: Percentage of scores for the apparent motor construction sections in javelin throw according to the opinions of specialists

Apparent motor construction	Grading	Number of specialists		percentage of agreement
		Total	The agreed upon	
Preparatory Section	35%	10	8	80%
A- Holding and Carrying the Spear	5%	10	8	80%
B- Initial Position (Readiness)				
C- Approaching Run (Approach)	10%	10	8	80%
D- Throwing Steps (Balanced)	20%	10	8	80%
Main Section	55%	10	9	90%
A - Shooting Position	55%	10	9	90%
Final Section	10%	10	10	100%
A - Coverage and Balance	10%	10	10	100%
Total	100%			

1. **The Internet**
   Online resources were consulted to obtain up-to-date information relevant to motor learning, athletic training methods, and the design of educational programs.

2. **Arab and Foreign Scientific Sources and References**
   A range of Arabic and international scholarly publications and reference materials were reviewed to provide theoretical support and to guide the construction of the educational program.

3. **Personal Interviews**
   Interviews were carried out with specialists in motor learning and athletics to gather expert opinions regarding the implementation of the proposed educational program. These discussions addressed the suitability of the program for the research sample, the appropriate timing and sequencing of exercises, and the relevance of the training content to the participants' needs. The experts also emphasized the importance of standardized testing procedures as a key criterion for ensuring test validity and for distinguishing differences among individuals (Majed, 2022, p. 7) [10].

Homogeneity of the two research groups: "Researchers should form homogeneous groups with respect to the variables relevant to the research" (Van Dalen, 1984, 398) [8]. Table (2) illustrates this.

Table 2: Shows the results of homogeneity between the two research groups in the variables (age, height, and body mass)

Variables	Units	Mean	SD	Mode	Skewness
Height	cm	173.327	5.258	173	0.062
Mass	kg	65.52	4.062	66.4	0.216
Age	year	20.67	0.712	20	0.28

Table (2) shows that there is homogeneity among the individuals of the research sample in terms of (age, height, and mass). 3-6- Equipment and tools used: (Electronic scale to measure (length and mass), electronic calculator (laptop - AZOZ), stopwatch (one), measuring tape (50 m), medicine balls weighing (3) kg, (2) white borax (to determine distances in the main experiment), planning tape (to draw the field and throwing sector), (20) sports shirts of different colors, spears weighing (600), (700), and (800), auxiliary tools (indicators).

Educational program

1. Educational program for the two practice scheduling methods (fixed and variable, accompanied by mental training): The researchers wrote the two educational programs for learning the technical performance of the javelin throwing activity, which consisted of (8) educational units, with two educational units per week, with (90) minutes per educational unit. Each educational unit included (the preparatory section), which included taking into account absences and a general warm-up. The special section, the "main section," which contains the educational and practical parts, and the "final section," which includes calming exercises. Appendix (2) illustrates an educational unit for the two experimental groups using the fixed and variable practice scheduling methods. These two methods were accompanied by mental training, which was used in the educational part and lasted (3-5 minutes). Each educational program contained the same vocabulary as the program followed, taking into account the differences in the method of distributing the exercises and the rest periods between them.
2. The educational program timeline: The two educational programs included (24) educational units for the educational methods distributed among two groups as follows: (8) educational units - the experimental group (training scheduling of both fixed and variable types accompanied by mental training). The implementation of the educational program took four weeks, during which the educational units were distributed at a rate of two educational units per week for each group, and the duration of each educational unit was (90) minutes, as shown in Figure (1), as follows:

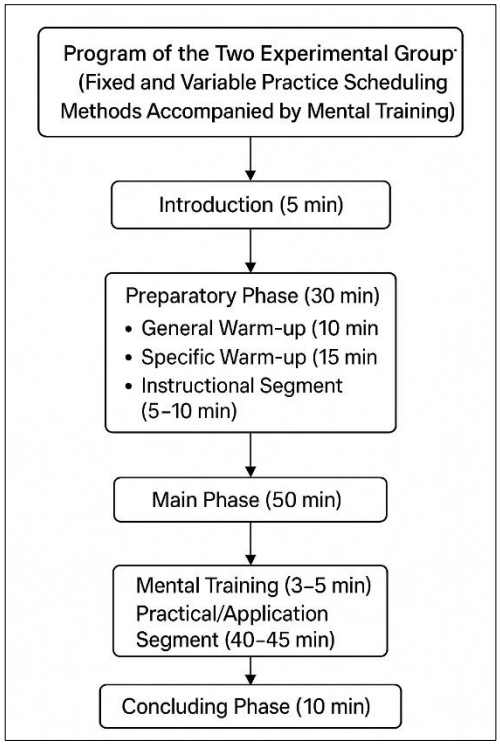

Fig 1: Shows the distribution of the educational program for each of the two experimental groups

The main part of the program for the two experimental groups (the fixed and variable practice scheduling method) differs from the standard program, as the educational portion of the main section ranges from 5-10 minutes, while the practical portion also ranges from 40-45 minutes. This is due to the specificity of the programs used for these two groups. The first and second experimental groups used the fixed and variable methods, accompanied by mental training, which required rest periods between repetitions and exercises during a single educational unit. The second experimental group used the variable method, accompanied by mental training, which also required rest periods between repetitions and exercises, depending on the type of training, whether individual or group, as well as the use of mental training.

Exploratory experiments

These were conducted on students outside the research sample, but within the research community itself, numbering (10) students, in order to obtain positive results before beginning the implementation of the main experiment. The exploratory experiments conducted by the researchers are:

1. The first exploratory experiment: The researchers, in cooperation with the support team, conducted it on December 26, 2024, at 10:30 a.m., applying the educational program for the first experimental group (the fixed method accompanied by mental training).
2. The second exploratory experiment: The researchers, in cooperation with the support team, conducted it at 8:30 a.m. on December 26, 2024, applying the educational program for the second experimental group (the variable method accompanied by mental training).

The objectives of the exploratory experiments were:

- The suitability of the duration of the educational unit and its sections for the research sample.
- The validity of the educational program sections and the students' responses to them.
- The suitability and uniformity of the number of repetitions of the exercises in the two experimental groups.
- To ensure the validity of the educational curricula for the two experimental groups.
- To identify and prepare for any errors, difficulties, and problems expected in implementation.

Pre-tests, Main Experiment, and Post-tests

1. **Pre-tests:** The pre-tests were conducted for the two experimental groups on January 2-3, 2025, with the assistance of the support team. Before the students took the pre-test, the researchers performed two attempts in front of the students to gain an idea of how to perform the activity. The pre-tests were conducted by giving each student (3) attempts in accordance with the International Amateur Athletics Law. Spears weighing 800 grams were used. Each attempt was accompanied by a measurement of the level of achievement on the field of the College of Physical Education and Sports Sciences at the University of Kirkuk. 3-9-2 Main Experiment: The researchers implemented the two educational programs for the two groups on Sunday, January 5, 2025, with two educational units per group per week. These units were distributed according to the weekly lesson schedule for the first stage of the College of Physical Education and Sports Sciences, and according to the athletics schedule. The schedule divided the two groups as follows:

a) (The first experimental group, Section A) on Sundays at 8:30 and Tuesdays at 10:30 each week. (The second experimental group, Section B) on Sundays at 8:30 and Tuesdays at 10:30 each week. After that, the researchers implemented the experiment, which included two methods: (the fixed method accompanied by mental training). The method was a practice

schedule (fixed and variable), accompanied by mental training for the experimental group. This involved performing repetitions and exercises, provided that no exercise was repeated in two consecutive attempts, and that the rest period between repetitions was equal to or longer than the duration of the performance. This was done under the supervision of the researchers at the college's stadium at the university. The implementation of the two educational programs was completed. On February 13, 2025

2. Post-tests: The researchers conducted a test to measure technical performance and achievement in javelin throwing for the two research groups on February 14-15, 2025. Each student was given (3) attempts, in the same manner as the pre-test. The simple correlation was for the best attempt, and the correlation coefficient reached (0.89), which is a correlation coefficient.

Statistical Methods

The researchers used the Statistical Package for Social Security (SPSS) program to process the statistical data, which included: (arithmetic mean, standard deviation, t-test for two related and unrelated means of equal number, and percentage).

Results and discussion

Displaying the results of the (T) test between the pre- and post-tests in learning the technical performance in javelin throwing for the two research groups.

Table 3: Shows the results of the (T) test between the pre- and post-tests in learning the technical performance in javelin throwing for the two research groups

Groups	Program and practice scheduling method	Pre-test		Post-test		(SIG) value*
		Mean	SD	Mean	SD	
Experimental group	Fixed and Variable Practice Scheduling	42.624	1.684	56.766	2.599	0.000
Control group	Tutorial (Method Followed)	43.123	2.743	53.466	1.617	0.000

* Significant when the sig value is less than the error rate > (0.05)

Presenting the results of the (T) test between the pre- and post-tests on the level of achievement in javelin throwing for the two research groups.

Table 4: Show results of the (T) test between the pre- and post-tests on the level of achievement in javelin throwing for the two research groups

Groups	Program and practice scheduling method	Pre-test		Post-test		(SIG) value*
		Mean	SD	Mean	SD	
Experimental group	Fixed and Variable Practice	23.213	1.454	35.766	1.376	0.000*
Control group	Educational Program (Method Followed)	23.113	2.212	32.108	2.617	0.000

Displaying the results of (T) between the test and the post-test in learning technical performance in javelin throwing for the two research groups

Table 5: Shows the results of the (T) test between the two groups in the post-test for learning technical performance and the level of achievement in javelin throwing

Variables	Experimental group		Control group		(SIG) value*
	Mean	SD	Mean	SD	
Technical performance	56.766	2.599	53.466	1.617	0.002
Level of achievement	35.766	1.376	32.108	2.617	0.000

Discussion of the Results

1. Discussion of the Results between the Pre- and Post-Tests of the Two Research Groups:

Tables (3, 4) show that there are significant differences between the pre- and post-tests of the two research groups in learning technical performance, as well as the level of achievement in javelin throwing, and for the post-test. The researchers attribute this to the influence of the educational program for both (the educational program for the fixed method accompanied by mental training) and (the educational program for the variable method accompanied by mental training), including the arrangement and organization of the exercises contained in each educational unit, the manner in which they are applied by the student, and the proper use of exercise times and repetitions according to the requirements of each of the practice scheduling methods used in the research, whether the type of training is fixed or variable. This is in addition to the new use of mental training with these two methods, as mental training complements physical training. Its use for a time period of (3-5 minutes) was appropriate for the sample, which helped improve learning technical performance and the level of achievement in javelin throwing. Together, in the educational unit, it has an impact on learning technical performance and the level of achievement in javelin throwing. Based on the results obtained in the post-test, and the increase in the verbal test over the pre-test, it can be said that these results are an indicator of learning. Since various training scheduling methods rely on repetition, as does mental training, repetition is a process that ensures the acquisition of learning and the possibility of developing it, Shalash and Mahmoud state, "The process of learning a skill cannot be achieved simply by the motivation to learn it. Rather, it must be practiced and repeated time and time again so that the learner can control his movements and perform them correctly." (Shalash and Mahmoud, 2000, p. 129) [7] In the first experimental group, learning occurred in technical performance and the level of achievement, as this group relied on the use of the variable method in scheduling practice, accompanied by mental training, which meant performing a set of exercises specific to learning technical performance in javelin throwing, with repetitions of the exercises being in different locations (different places), and then mentally training them, with the same training being repeated in the same place, then the possibility of changing the training to another location, and continuing until the completion of all exercises and repetitions in the educational

unit to achieve technical performance and appropriate achievement, as training on tasks is carried out in the same manner until the completion of all educational units (Mahjoub, 2000, 205) [9]. When researchers talk about rest periods in this type, they are equal to the repetition time, more or less, and depend on what was obtained from conducting the exploratory experiment, which relied on knowing the difficulty and ease of each exercise. This helped the individuals in this group improve in technical performance, and this was reflected in an increase in the level of achievement in javelin throwing. The second experimental group, which used the fixed method of scheduling practice, accompanied by mental training, led to learning in the technical performance of the individuals in this group, as well as the level of achievement. The reason for this was the optimal use and appropriate employment of the method with mental training, which is considered complementary to the other, to be distinctive in the educational program, as the exercises were performed in it as in the first group, but with stability in the performance position until the repetitions of each exercise were completed, and the rest periods between repetitions were similar to the program used in the first group, as the rest between repetitions in the educational units of this method (Khioun, 2002, 84-85) [6], which helped in obtaining positive results in the post-test in technical performance and the level of achievement in javelin throwing, as the success of learning any motor skill depends on a lot of training and exercise, the correct method, and the organization of work and rest periods, in addition to the ideal use of mental training. Then, what the individuals of the group applied practically and as a result of the practical application of the technical stage or the entire activity, in addition to the units of the educational program and what they contain of exercises and repetitions, and the rest periods were according to the educational program prepared by the researchers of the material, which contributed to improving the level of technical performance and the level of achievement. Throwing the javelin clearly and achieving better results in the post-test "The training period and exerting effort in training and continuous repetitions are necessary in the process of education and training. It is a helpful and necessary factor in the process of the individual's interaction with the skill and controlling his movements and achieving motor coordination in his performance" (Shalash and Mahmoud, 2000, 129) [7].

2. Discussion of the results of the post-test between the two research groups regarding learning technical performance and achievement level in javelin throwing

Table (5) shows significant differences between the two groups in learning technical performance and achievement level in javelin throwing. The first experimental group, which used a variable method accompanied by mental training, and the experimental group, which used a fixed method accompanied by mental training, both in learning technical performance and achievement level. In both technical performance and achievement level, the first experimental group outperformed the second group in both technical performance and achievement level in javelin throwing.

In conclusion, the first experimental group was superior in learning technical performance and achievement level in javelin throwing. The researchers attribute the superiority achieved by the first experimental group in learning technical performance and level of achievement to the second group, which used the fixed method accompanied by mental training. This method includes both exercises, repetitions, and rest periods between repetitions, whether the training is individual or group. This is a process of planning for distributing rest periods between repetitions and practicing educational activities and situations in the educational unit (Al-Banna, 2001, 16) [3]. What distinguishes the program of the first experimental group is that it includes the use of the variable method and mental training, and takes advantage of their advantages together. This means performing repeated attempts at different practices related to learning technical performance and level of achievement in javelin throwing, which requires repetitions of exercises from different locations, i.e., not repeating the same training in the same location. Thus, the results of this study led to the practice scheduling method (using the variable method accompanied by mental training) being the best for learning technical performance in javelin throwing, as the results of this study indicated. As for the level of achievement, the researchers attribute this to the fact that the javelin throw is an activity with difficult performance, but the individual can achieve it. The level of achievement is determined by the individual's implementation of the movement path for the javelin throw stages, leading to good performance and, consequently, good achievement. Technical performance and achievement are linked to effectiveness. Mahjoub (2000) [9] indicates that "achievement depends on the individual's ability to store in motor memory, as the value of athletic performance reflects an accurate picture of the most complex things the human motor system can do" (Mahjoub, 2000, 226) [9]. This result is consistent with the results of the study by Al-Bakri (2000) and the study by Al-Husseini (2004). The second experimental group, which used the practice scheduling method (using a fixed method accompanied by mental training), did not show any significant improvement despite its apparent superiority in technical performance and achievement in the javelin throw in the post-test compared to the pre-test. This result is consistent with the results of the study by Al-Khaza'i (2005) [5]. In conclusion, as indicated by the study by Hussein & Majed (2023) [11], it is noted that the educational system from which cognitive training is based indicates that the learner's thinking and mental processes in the learning process. Cognitive is considered the first experimental and is restricted (Hussein & Majed, 2023, 12) [11].

Conclusion

1. There is a positive effect of the practice scheduling method (fixed and variable, combined with mental training) on learning technical performance and achievement in javelin throwing.
2. There is a positive effect of using the practice scheduling method (fixed and variable, combined with mental training) in the post-test on both technical performance and achievement in javelin throwing.
3. The experimental group that used the practice scheduling method (variable and accompanied by mental training) outperformed the post-test in both technical performance and achievement levels in javelin throwing.

Recommendations

1. Emphasize the use of both practice scheduling (fixed and variable methods, accompanied by mental training), which were implemented within the educational program for first-year students in the College of

Physical Education and Sports Sciences, for technical performance and achievement levels in javelin throwing.
2. Emphasize the use of practice scheduling (variable methods accompanied by mental training) in other activities, given its positive impact on technical performance.

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