



تأثير برنامج قائم على التصور الذهني والأنشطة البصرية على بعض القدرات الحسية الحركية لدى متعلمي لعبة الكرة الطائرة

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الكلمات المفتاحية: التصور الذهني، الأنشطة البصرية، القدرات الحسية الحركية، الكرة الطائرة
مستخلص البحث:

البرنامج لقياس زمن رد الفعل ودقة الأداء والتنسيق الحسي الحركي، أظهرت النتائج تحسناً ملحوظاً في أداء المهارات الأساسية لدى المجموعة التجريبية، مع فروق ذات دلالة إحصائية مقارنةً بالمجموعة الضابطة، ان هذه النتائج لها أهمية في دمج أساليب التعلم المعرفي والبصري لتعزيز التعلم الحركي، وتشجع على تطوير برامج تعليمية تحسّن مهارات اللاعبين من خلال تقنيات متقدمة تتجاوز التكرار البدني التقليدي. اوصى الباحث بدمج هذا النوع من البرامج في مناهج التربية البدنية لتحقيق تحسينات نوعية في الأداء الفني والذاتي للمتعلم.

هدفت هذه الدراسة إلى أثر برنامج تعليمي يجمع بين التصور الذهني والأنشطة البصرية على تطوير قدرات الحسية الحركية والمرتبطة بالمهارات الأساسية في لعبة الكرة الطائرة، حيث يُعدّ التعلم الحركي أساسياً لتحسين الأداء الفني في كرة الطائرة، إذ تعتمد مهارات مثل الإرسال والإعداد والضرب الساحق على التنسيق الدقيق بين الحواس والحركة، حيث شملت عينة الدراسة ٣٠ طالباً من كليات التربية البدنية وعلوم الرياضة، تم تقسيمهم إلى مجموعتين: مجموعة تجريبية تلقت البرنامج، ومجموعة ضابطة تلقت التعليم التقليدي. حيث استمر البرنامج التعليمي ثمانية أسابيع، وتضمن جلسات تصور ذهني وأنشطة بصرية لتعزيز الإدراك الحركي، أُجريت اختبارات قبل وبعد



performance accuracy and sensorimotor coordination were. The findings indicated that there was a great enhancement of basic skills performance in the experimental group, and the differences were statistically significant when compared to the control group. The results substantiate the significance of combining the learning, cognitive, and visual approaches with the motor learning encouraging the creation of training programs that will help players advance in their skills by applying sophisticated techniques beyond the simple repetitively oriented physical training. The researcher suggests including this kind of program in the physical education curricula to bring qualitative change in the technical and self-performance of the learner.

Keywords: Mental imagery, Visual activities, Sensorimotor abilities, Volleyball

The effect of a program based on mental imagery and visual activities on some sensorimotor abilities among volleyball learners

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Abstract:

The technical performance in volleyball cannot be enhanced without motor learning as the ability to serve, set, and spike the ball requires accurate coordination between the senses and movement. The study will explore how a mental imagery-based and visual activity educational program can be used to enhance the acquisition of certain sensorimotor skills in regard to the fundamental volleyball skills. The participants involved in the study were 30 students of colleges of physical education and sports science, split into two groups: an experimental group, which was provided with the program, and a control one, which was provided with traditional teaching. The training took eight weeks and consisted of mental imagery and visual exercises to improve motor perception. Pretest and after program tests were carried out to determine how fast reaction time,



systems resulting in better learning and minimal errors in the execution. (Castro-Alonso et al., 2013). Moreover, visual activities are complementary and help the learner to process and organise motor information, thereby making him effective in response and coordinate the visual-motor senses, which are vital aspects in learning complex volleyball skills.

Regardless of the established theoretical and practical advantages of such strategies, the physical education colleges do not have systematic educational programs that involve mental visualisation and visual activities. This leads to a supposed weakness in basic motor skills control in a fraction of the students (Cliff et al., 2012). This weakness is also reflected through the slowness of response time, inaccuracy in performance, and inability to coordinate motor activity, adversely affecting the formation of the level of athletic performance among students during the learning process.

Based on this therefore, there is a gap in knowledge and practice use of these high learning technologies in formal learning. It will require an investigation into how an adaptive educational program that involves mental visualisation and visual

Introduction:

Motor learning plays an important role in the process of motor skills development of athletes and students of physical education and sports science. Team sports like volleyball need a great deal of coordination between movement and senses to master. One of the pillars, which have a direct impact on the quality of technical performance, is the skills of serving, setting, and spiking, as the quality of the technical performance is determined by the ability of the learner to comprehend and perform moves correctly and fast. There is no secret that in this sphere the improvement of motor learning turns out to be a constant challenge because of the complication of skills and the specifics of the performance, which presupposes the formation of sensory-motor skills in the considerate and specialised manner. (Raiola, 2017).

Mental visualisation as a mode of motor learning enables the learner to improve his or her motor knowledge by being able to engage in an organised mental imagery of the motor movements before trying them in practice. Recent research has dwelled on the efficiency of mental visualisation in enhancing the ability of motor skills by activating motor neural



that result in a high degree of skill consolidation and enhanced learning effectiveness is greatly contributed by (Haibach-Beach et al., 2024). One of the most popular strategies that are used to improve motor learning in most sports is mental visualisation which helps in learning by lowering the errors and therefore enhancing accuracy. (Predoiu et al., 2020). In volleyball, a research has shown that an integration of mental visualisation with applied use results in great measures of enhancement in simple skills execution. (Anton et al., 2017).

Moreover, the literature has confirmed that activities involving visual activities are effective in improving cognitive skills associated with motor information analysis that leads to more precise and quicker motor performance. (Krakauer et al., 2019). One more study has also revealed that visual activities enhance faster responses and the ability to coordinate sensory and motor activities because they are very useful in teaching. Although there is this rich amount of evidence, it is important to have future researches that combine mental visualisation and visual activities in regular education programs to determine their effects on physical education learners particularly in learning

tasks will affect the development of sensory-motor skills pertaining to simple volleyball skills among students in physical education. The study will offer viable scientific contributions that will aid in refining the teaching techniques and mental conditioning, thus boosting the quality of the motor learning process in sports skills.

According to the above, this study aims at attaining some of the following objectives:

Evaluating the effectiveness of a learning programme based on mental visualisation and visual activities on the improvement of sensory-motor skills in learners.

Quantifying the influence of the programme on the development of the serve, set and spike in their accuracy, speed and coordination.

Assessing the motor performance of learners enrolled in the experimental learning programme and the traditional instruction.

Recent research reveals that motor learning builds up with a complex mental and motor processes that entail visualisation of the movements in the mind. The ability to incorporate skills



The group sampled included 30 students who were chosen purposely and were eligible to take introductory courses on volleyball skills according to the enrolment requirements set by the institution. The sample was randomly split into two groups (15 students in each) the experimental one who received the educational program and the control group (15 students) who received the standard instruction in eight weeks with three 60-minute sessions per week. There were organised mental visualisation exercises that signified fundamental volleyball abilities such as serving, setting, and spiking. It also involved visual activities to develop visual-perceptual skills and develop sensory-motor coordination. The students were put under close observation by the supervision of the researcher. Conversely, the research participants were subjected to a series of tests on various variables of the research such as motor response speed in the standardised tests to quantify the reaction time, the accuracy of the performance to determine the three basic skills and the visual-motor coordination in the tests that involve the eye tracking and the linkage of the visual perception and the movement. All pre and post program measurements were also done

volleyball as is the case in this research. (Yu & Smith, 2017).

Materials and Methods:

The research relied on an experimental design to investigate what happens to sensorymotor skills, when an educational program based on mental visualisation and visual activities is used in the Faculty of Physical Education and Sports Sciences. Two groups were used in the design; an experimental group which was the receiver of the program and a control group which was the receiver of the traditional instruction. Pre- and post-experiment measurement was done to establish the impact of the program. The findings of the study indicate that in countries with elevated migrant labor force participation rates, there is a lower social cost of migration (i.e. a reduction in the social compensation received by the host country's non-migrant population). According to the results of the research, the social cost of migration is reduced (i.e. the social compensation to the non-migrant population of the host country diminishes) in those countries where the rate of migrant labor force participation is high.



exercises in the enhancement of certain sensorimotor skills in volleyball players. (Shlonska et al., 2025).

The section is also aimed at demonstrating the qualitative and quantitative variation in the performance of such basic skills as passing, serving, and spiking prior to and following the program implementation. Thus, the given presentation can be considered a prelude to the discussion and interpretation of the results concerning the existing literature and past research in the area of motor learning and sports skills.

Table 1: The mean serving skill scores and standard deviations for the experimental and control groups.

Group	Stage	Mean score	Standard Deviation	Difference (After - Before)	Statistical Significance Value (p)
Experimental	Before the program	61.0	4.1	18.0 +	0.05
	After the program	79.0	3.5		
Control	Before the program	63.0	3.8	1.0 +	0.05
	After the program	64.0	4.0		

to facilitate objective comparison. (McKeen, 2013).

Data were analysed with the SPSS software, and scientific conditions were taken to the letter. These were the consideration of the fact that the participants were not injured or had a medical condition that can interfere with the motor performance, the homogeneity of the application and measurement conditions so that the environmental factors have the least effect and the delivery of uniform instructions to all participants (Verma, 2012).

Results of the Research:

Reporting the findings of the study is an important procedure that will prove the success of the research objectives. It is the process of emphasizing the effect of the independent variables on dependent variables in a scientific and objectively rigorous way. In this section, the statistical data will be presented by applying the field measurement tools and analyzing them with the help of the SPSS software to test the differences and their significance between the experimental and the control group. The presentation of the results serves also to explain the efficacy of the program based on mental imagery and visual



As obtained in Table 2, setting skills in the experimental group were significantly improved as the average performance rose by 22.0 points, with standard deviation of 3.7. This statistical significance was found to be ($p < 0.05$). Meanwhile, the control group exhibited the insignificant improvement in performance, reflecting the difference between 59.0 (3.6) and 61.0 (3.9) that was not significant ($p = 0.18$). The results indicate the success of the intervention to improve setting skills among the experimental group relative to the control group.

Table 3: The mean scores and standard deviations of spike skills for both the experimental and control groups.

Group	Stage	Mean spike score	Standard Deviation	Difference (After - Before)	Statistical Significance Value (p)
Experimental	Before the program	55.1	4.5	22.0 +	0.05
	After the program	75.2	4.2		
Control	Before the program	57.0	4.0	1.0 +	0.05
	After the program	58.4	4.1		

Table 1 demonstrates the average score and changes in performance of serving skill of both groups before and after introducing the training program. According to the results, the mean score of serving in the experimental group increased significantly, and the average score increased by 18.0 points, 61.0 of which increased to 79.0 (SD=4.1) to 3.5. This was statistically significant at the $p < 0.05$ level. However, the control group did not show such improvement, with the mean performance increasing by slightly less than 63.0 (3.8) to 64.0 (4.0); this was not found to be significant ($p = 0.15$). The findings indicate the success of the intervention on the improvement of serving skills among the experimental group as opposed to the control group.

Table 2: The mean scores and standard deviations of setting skills for both the experimental and control groups.

Group	Stage	Mean setting score	Standard Deviation	Difference (After - Before)	Statistical Significance Value (p)
Experimental	Before the program	58.4	4.3	22.0 +	0.05
	After the program	81.0	3.7		
Control	Before the program	59.0	3.6	1.0 +	0.05
	After the program	61.0	3.9		



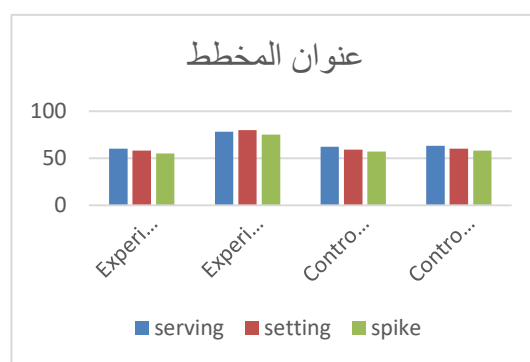
Discussion:

Moreover, the research confirms the hypothesis that motor learning does not solely depend on the body's motor rehearsal but involves the intensive use of mental images and relying on the cognitive processes of facilitating the mastering and solidification of the skills. Mental imagery helps the learner to recreate the movements through mental re-creation, consequently, facilitating the learning process through faster learning and decreasing the number of errors made in the real practice. The use of the visual sensory systems is associated with better perception and better motor organisation, which enhances the quality of motor response, and this can augment performance efficiency in different athletic settings. (Frank et al., 2016).

The findings of the study also demonstrate the relative ineffectiveness of conventional learning that is based on the practical exercise only without the ability to support cognition. There was no statistically significant difference in the chosen motor skills among students in the control group. (Clark & Harrelson, 2002). It means that genuine motor learning involves doing much more than merely physical means of repetition, but encompassing mental activities which

Table 3 indicates the intervention effect on the spiking skill. The average scores of the experimental group improved significantly and increased in terms of mean 55.1 (± 4.5) to 75.2 (± 4.2) by the conclusion of the intervention with the difference of 20 points. This was statistically significant at the level of ($p < 0.05$). Conversely, the control group failed to demonstrate a significant change in performance, as the level of statistical significance of ($p = 0.16$) showed that there was a low intervention effect in the control group.

Figure 1: Arithmetic means of performance in serving, setting, and spiking skills before and after the training program.





their targeting and aiming when delivering a serve (Kurowski et al., 2018).

The activities also help to enhance visual-motor coordination which is one of the major components of a successful way of performing serves in a competitive environment. As a few of the studies have also shown, visual training enhances reaction time and minimizes technical errors, which explains the massive increase in the performance of the experimental group (Theofilou et al., 2022). Such significant positive change at the statistical significance level demonstrates the significance of interfrontal and visual learning techniques in the motor skills training programs in volleyball. The use of the traditional training alone does not produce equivalent improvements in performance and this supports the necessity to revise the training curricula and devise a more interactive teaching and cognitive instruction that promotes efficiency in learning. The findings of the setting skill revealed a stronger enhancement of the performance scores following the application of the educational program.

These findings indicate the influence of the activities that connect motor thinking

assist in the development of organised mental image, which serve to enhance control of physical performance. (Pesce et al., 2019).

Given the above findings, the specifics of the improvement in learning each skill will be addressed individually, beginning with the serving skill, the very first and initial point of engagement in playing volleyball. Mental imagery has a significant role in strengthening motor learning in acquiring this essential skill. (Schack et al., 2014).

The results of the study showed that there was a great enhancement in serving performance in the experimental group as compared to the control group. This is likely because of the success of the mental image and visual activities-based learning program that improves the players to achieve accuracy and speed in serving. Mental imagery enables players to visualize individually the serving movements many times, mentally, and this will reinforce the motor patterns and entrench the skills without the player endlessly participating in motion. In its turn, this promotes the process of learning and improves the level of technical performance. Visual tasks are also an aid that assists the players to effectively monitor the ball and enhance



of visual practices and mental imagery in the acquisition of neuromuscular coordination and fine motor skills. The smash shot is one that demands high coordination and timeless movement and here is where mental imagery comes in where the player can envisage the entire movement before performing the actual movement, thereby enabling the player to control the amount of force and direction and thus increase accuracy (Li et al., 2025).

Moreover, the visual activities help to acquire the reflexes quickly and gain skills of anticipating the movement of the opponent, and make the player more capable of directing the shot properly in the situational conditions during the matches. These mental motor skills play critical roles in on-field execution of the smash shot, which proves that mental and visual training is effective in bringing about technical and physical excellence.

The findings are useful in advising the coaches on the essence of implementing vigorous training sessions that involve mental imagery and visual training to increase the ability of players to master this important technical skill that defines the victory or defeat of matches. (Liu et al., 2016).

and visual perceptions, which aids the player in better analysis of the situation in making the best motor decisions in executing the set. Applied environment involves a high level of getting time and distance right, visual perception and mental images training allow the player to train themselves in different scenarios and to develop skillful plans on how to move. Besides, the study findings show that the development of sensorimotor capabilities by the means of mental and visual training is not confined to the skill of setting but also the speed of the reaction. The set makes the player more ready to respond to the evolving situations in the match. These results reinforce the current tendency to use integrated motor learning in the sport education context by focusing on the stimulation of mental images and visual training in parallel with the field training, to unleash the best development of the basic volleyball skills. (Renshaw et al., 2010).

Although the findings on the smash shot skill reveal that the training program has brought out a great change in the performance of the group that has undergone the training program as opposed to the control group, this indicates the efficiency in a combination



learning strategy in the academic curriculum to promote efficiency in its implementation and cognitive learning. Also, further studies are recommended in order to evaluate the effectiveness of other motor learning models and their impact on the acquisition of sophisticated skills and different levels of performance in sports. There is a need to develop integrated measurement instruments indicating qualitative enhancement in motor learning particularly the ones that require to deal with mental pictures and sensori motor abilities.

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Conclusions:

The combination of mental imagery and visual exercises is a good method of learning some basic volleyball skills since you would be more precise and respond quicker to motor tasks. The process of converting theoretical motor knowledge into practical skills of competent and lasting performance is done at a rapid rate through comprehensive motor learning. When sensorimotor perception and mental imagery are combined in learning programs, they form a more integrated learning space, which makes them more effective and less prone to error as compared to traditional learning styles. The improved learning of students highlights the importance of incorporating such a program into the physical education and motor learning programs of universities.

Recommendations:

It is proposed to develop the way of teaching relying on the mental images and the visual motor learning to make students learn the fundamentals of the team sports, in particular volleyball. It is also advisable to develop regular education programs which involve the implementation of integrated motor



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Practical Application: The serving skill was done with evaluation of its performance.

Mental imaging and movement are used simultaneously to enhance accuracy and consistency.

Conversation and Evaluation: Performance feedback.

To make players learn new skills, it is encouraged to use a mental picture between the training sessions.

Unit Duration: Approximately 60 minutes, and it consists of all the above-mentioned stages.

Sample Educational Unit:

Unit Title: Visual Exercises and Mental Imagery to Serve Your Game of Volleyball Better.

Unit Objectives: Increase the accuracy and speed of the serving technique.

Enhance the relationship between seeing and doing things.

Increase the ability of the player to visualise mentally the serving motion.

Contact Content: Introductions and Theory: Explanation of the relevance of serving skills and the impact of mental images and visual activities on enhancing performance.

Mental Imagery Exercise: The subject should have a clear mental image of the serving motion in terms of the positioning of the body, the movement of the hands and the movement of the ball.

Mental visualization should be done during 10 minutes repeatedly with attention to the accuracy and sequentiality of the movement.

Visual Exercises: Visual tasks that enable you to track a moving ball on a screen on visual tasks, such as tracing the route of a ball when its flying.

Practicing to respond fast to various visual signals that accompany the serving motion.