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A PROPOSED EDUCATIONAL PROGRAM BASED ON THE PROBLEM-SOLVING STRATE.GY FOR TEACHING BASIC VOLLEYBALL SKILLS TO INTERMEDIATE SCHOOL STUDENTS

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Abstract

The present study aims to identify the effect of the problem-solving strategy on learning the accuracy of serving, spiking, and blocking in volleyball. The researcher adopted the experimental method, and the study sample consisted of 40 male students in the first semester of the academic year 2023–2024. The sample was equally divided into two groups: an experimental group taught according to the problem-solving model, and a control group taught using the traditional model. The results of the study indicate that both the experimental and control groups showed improvement in learning the targeted skills, but to varying degrees. The experimental group outperformed the control group as a result of using the problem-solving strategy, in comparison with the control group, which relied on the traditional method (demonstration). Accordingly, it is recommended that further research and studies be conducted to examine the impact of the problem-solving strategy on developing skill-related aspects in games and other sport fields. It is also suggested to investigate the effect of this strategy on discovering and developing students' creative abilities while learning various skills.

Keywords: Educational Program; Strategy; Problem-Solving; Basic Skills; Volleyball.

Introduction

In the present era, humanity has witnessed a qualitative leap in various sciences and disciplines. Scholars have made significant contributions to this progress across all fields of knowledge, including sport sciences, which have attained a prominent position and played an important role in the development of different sports (De Biasi, 2020). Researchers have exerted considerable efforts to devise and refine new teaching methods and approaches that keep pace with advances in diverse areas of knowledge, with the aim of achieving a qualitative shift in sports performance (Ramos, 2021). Education today no longer focuses solely on providing students with information; rather, it places greater emphasis on enhancing activity and interaction among learners, whether in groups or as individuals (Yeri, 2024). The primary goal is to equip them with social and communication skills and to foster positive attitudes towards their peers (Coutinho et al., 2021). Such interaction plays a major role in strengthening students' sense of belonging to the group and consolidating

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internal bonds, thereby supporting the educational process as a whole (Li, 2025). The teacher plays a central role in stimulating learning by organizing and directing students' experiences within a positive and interactive learning environment (Sgrò et al., 2022). At the same time, learners are required to participate actively in the learning process instead of relying on rote learning and passive reception (Abdul-hasan & Abdul-samea, 2023). The teacher has the freedom to choose the instructional strategies deemed appropriate for achieving the intended objectives, in light of their skills and professional experience (Silva et al., 2020). There are numerous teaching strategies and methods that can be adopted to facilitate the transfer of knowledge and ensure it reaches learners' minds with minimal effort and in the shortest possible time (Saleh, 2025). Among the most prominent of these modern approaches is the problem-solving strategy, which activates the learner's role and encourages active engagement with meaningful challenges, thereby enriching educational experiences and positively influencing behavior (Awaluddin et al., 2025). Volleyball is one of the sports that has witnessed remarkable development and can be played on various hard surfaces. The modern game is characterized by precision and agility and relies heavily on basic skills such as spiking, serve accuracy, and block accuracy (Keoliya et al., 2024). Improving these skills constitutes a professional challenge for coaches, who allocate a substantial portion of training sessions to developing players' performance and teaching them the techniques required to reach advanced and integrated levels of play (Tabynbayev, 2025). Serving, as one of the fundamental skills in volleyball, plays a crucial role in ensuring smooth and effective performance (Ahmed & Hamoodi, 2021; Hussein & Kasim, 2022). All the physical and technical efforts made by players become meaningful only when they are able to execute serves and spikes accurately and successfully into the opponent's court (Oliinyk et al., 2021). Over the decades, various spiking techniques have been developed, accompanied by continuous technical refinements (Ali and Kasim 2022; Giatsis & Tilp, 2022). The importance of the present study lies in analyzing the effect of an instructional program based on the problem-solving strategy on learning basic volleyball skills specifically serve accuracy, spike accuracy, and block accuracy. This strategy focuses on mental processes and the use of analytical thinking to perform tasks with precise cognitive demands. These skills play a central role in the game, as they require mental imagery and rapid analysis of different situations in order to select appropriate decisions within limited time frames. During the stages of learning these skills, the strong influence of concentration, precision, and sustained attention becomes evident. The player must possess quick perception and rapid analytical ability to make correct decisions and execute performance accurately and efficiently. This interaction between mental and physical processes contributes to performance improvement and the achievement of tangible results, making it essential to handle the specific demands of sports situations in a precise manner in order to attain optimal efficiency and achieve effective accuracy in serving, spiking, and blocking.

Research Problem

Based on the previously stated context and the researchers' professional experience, it is evident that there is a weakness in learning certain basic volleyball skills, particularly serve accuracy, spike accuracy, and block accuracy. This weakness is largely attributed to the limited variety in the use of teaching methods, as lessons are often delivered through a single, repetitive style across all instructional situations, without adequate consideration of individual differences among students (Apidogo, Burdack & Schöllhorn, 2021). It is well known that mastering any skill requires the activation of a set of mental processes, and the development of such skills depends on methods that help the learner think, infer, and discover facts (Ibrahim & Ulaiwi, 2024). Volleyball skills such as serve accuracy, spike accuracy, and block accuracy require instructional strategies capable of enhancing the learner's ability to organize, comprehend, and retain information in a manner that is compatible with their individual abilities (Kumar, 2018). When only one instructional approach is used, it becomes difficult to harmonies teaching with the varied capacities of all students in a given class (Jiao, 024).

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Therefore, the researchers emphasize the importance of diversifying teaching methods in accordance with learners' levels, and relying on appropriate activities that help them develop their skills effectively, with a focus on innovation and the search for techniques that stimulate thinking and creativity to achieve better learning outcomes. In this regard, the research team considers the problem-solving strategy to be one of the effective teaching approaches that contribute to consolidating skills among learners. Consequently, the present study seeks to determine the effectiveness of a divergent-thinking approach based on problem-solving in learning basic volleyball skills, namely serve accuracy, spike accuracy, and block accuracy.

Research Aims

The study aims to:

1. Identify the effect of the problem-solving strategy on learning the volleyball skills of serving, spiking, and blocking.
2. Identify the significance of the differences between the experimental and control groups in learning some basic volleyball skills (serving, spiking, and blocking).

Research Hypotheses

1. There are statistically significant differences between the pre-tests and post-tests of the experimental and control groups in some basic volleyball skills (serving, spiking, and blocking) in favour of the post-tests.
2. There are statistically significant differences between the experimental group and the control group in learning some basic volleyball skills (serving, spiking, and blocking) in favour of the experimental group.

Research Delimitations

- **Human domain:** Second-grade intermediate school students.
- **Temporal domain:** From 29/09/2024 to 10/01/2025.
- **Spatial domain:** Volleyball court at Al-Farqadayn Intermediate School for Boys.

Methodology

Research Method

The researchers employed the experimental method with an equivalent-groups design (experimental and control), as it is appropriate to the nature of the research problem.

Research Sample

The research population consisted of second-grade intermediate students at Al-Farqadayn Intermediate School for Boys, with a total of 137 students, selected on the basis of the availability of the necessary requirements for conducting the study. After excluding failing students, deferred students, injured students, and active players (28 students in total), the final population became 109 students. Subsequently, the researchers used a random draw to select a sample of 40 students. The sample was then divided into two groups (experimental and control), with 20 students in each group.

To avoid any factors that might influence the research results, the researchers conducted homogeneity and equivalence procedures for the sample:

- Homogeneity among the individuals of the sample was verified in terms of height, weight, and age.
- Equivalence between the two groups was verified in three skill tests:
    - High front serve (tennis-style)
    - Spike
    - Block

These variables were processed statistically using the coefficient of variation to establish homogeneity and the t-test to confirm equivalence. The results are shown in Tables (1) and (2).

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Table 1: Homogeneity of the research sample in the variables of height, weight, and age

Variables	Unit of measurement	M	SD	Coefficient of variation (%)
Height	cm	172.31	3.15	1.83
Weight	kg	74.36	2.82	3.79
Age	year	21.23	0.87	4.09

Table (1) shows that the research sample is homogeneous in the variables of height, weight, and age, as the values of the coefficient of variation are all less than 30%.

Table 2: Equivalence of the two research groups in the variables under investigation

Variables	Unit of measurement	Control group		Experimental group		Calculated t-value
		M	SD	M	SD	
Serve	Degree	13.56	1.98	14.02	1.63	0.78
Spike	Degree	12.87	2.09	11.93	2.17	1.36
Block	Degree	7.89	1.67	8.12	1.45	0.50

Tabulated t-value = 2.02 at the 0.05 significance level and 38 degrees of freedom.

Table (2) shows that the type of significance for all variables is non-significant, because the calculated t-values for all variables are smaller than the tabulated t-value of 2.02 at the 0.05 significance level and 38 degrees of freedom. This indicates the equivalence of the two groups in the variables under study.

Instruments, Tools, and Devices Used

Research instruments are those means that help the researcher collect data and solve the research problem in order to achieve the study objectives, whether these instruments are data forms, samples, or devices. Therefore, the researchers used the following instruments, tools, and devices:

- Arabic and foreign references
- Questionnaire
- Observation and personal interviews
- Tests and measurement
- 10 markers (cones)
- 24 volleyballs
- Medical scale (type ACS-23)
- Standard volleyball court
- Leather measuring tape for height
- Non-elastic rope
- 4 whistles
- 4 electronic stopwatches (Casio)
- Adhesive tape and colored chalk

Tests Used in the Research

Performance-accuracy evaluation tests: After reviewing scientific sources in the field of volleyball, testing, and measurement, the researchers selected tests to assess the accuracy of performance in the skills under investigation, as follows:

First: Test for Evaluating the Accuracy of the High Front (Tennis-style) Serve in Volleyball

Test objective:

To measure the accuracy of performing the high front (tennis-style) serve.

Equipment used:

Standard volleyball court, 5 official volleyballs, and colored adhesive tape to divide the court areas.

Performance specifications:

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The tested student stands at the middle of the end line of the court (in the half facing the segmented scoring zones), at a distance of 9 meters from the net. From this position, the student holds the ball and performs the high front (tennis-style) serve so that the ball crosses the net to the opposite, segmented half of the court.

Performance conditions:

If the ball does not cross the net, or if it crosses the net but lands outside the boundaries of the segmented opposite court, the attempt is counted as one of the five allotted attempts but no score is awarded for it.

Scoring:

For each correct serve, the tested student receives the score of the zone in which the ball lands. Each student has 5 attempts, and since the zones are scored from 1 to 5 points, the maximum total score for this test is 25 points. If the ball lands on a line separating two zones, the student is awarded the score of the higher zone.

Second: Spike Accuracy Test

Test objective:

To measure the accuracy of performing the spike in volleyball.

Equipment used:

Standard volleyball court, 5 official volleyballs, and colored adhesive tape to divide the opposite court into zones.

Performance specifications:

The tested student performs the spiking skill from position (4), while the teacher sets the balls from position (3). The student then executes the spike toward the opposite court.

Performance conditions:

- Each tested student has 5 consecutive attempts.
- The set must be of good quality in every attempt.
- Scores are awarded according to the zone in which the ball lands, as follows:
    - Zone (A): 3 points
    - Zone (B): 1 point
    - Zone (C): 5 points
    - Outside these zones: 0 points

Scoring:

The tested student is awarded the total number of points obtained across the five attempts. The maximum total score for this test is 25 points.

Third: Block Accuracy Test

Test objective:

To measure the accuracy of the blocking skill in volleyball.

Equipment used:

Standard volleyball court, 5 official volleyballs, and colored adhesive tape to divide the opposite court into zones.

Performance specifications:

The tested student stands in position (3), in front of the net at a distance of 50 cm, in the ready position for blocking. The teacher performs the spike from the opposite court, and the student performs the block according to the previously agreed technique.

Performance conditions:

- Each tested student has 5 consecutive attempts.
- The spike must be of good quality in every attempt.
- Scores are awarded according to the zone in which the ball lands after the block, as follows:

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- Position (2): 2 points
- Position (3): 3 points
- Position (4): 4 points
- Outside these positions: 0 points

Scoring:

The tested student is awarded the total number of points obtained across the five attempts. The maximum total score for this test is 15 points.

Pilot Study

The pilot study is considered a form of practical training that allows the researcher to identify the positive and negative aspects that may arise during the implementation of the tests, with the aim of avoiding them later. Prior to conducting the pilot study, the researchers ensured that all necessary tools and equipment required for the tests were available, and 12 students were selected as a sample from the research population. The specified tests were administered on 1/10/2023 with the assistance of the supporting work team. The purpose of this procedure was to obtain the desired results and achieve the predetermined objectives, which were as follows:

1. Exploring the conditions under which the tests are conducted and the suitability of the location for their implementation.
2. Ensuring the validity and adequacy of the tools used in the tests.
3. Determining the time required to administer each test.
4. Familiarizing the assisting team with how to administer the tests and how to record the results.
5. Identifying the main obstacles in order to avoid them during the main experiment.

Scientific Bases of the Tests

The researchers relied on the scientific bases of tests (reliability, validity, and objectivity) to determine the practicality of the tests used in the research, as follows:

Test Reliability

Test reliability refers to the extent to which a test yields the same or very similar results when it is re-administered to the same individuals under similar conditions (Naderi et al., 2025). To ensure reliability, the researchers adopted the test–retest method. The experiment was conducted on a sample of 14 students from the research population. The test was administered for the first time on 3/10/2023 at the volleyball Court of Al-Farqadayn Intermediate School, and then re-administered for the second time on 11/10/2023 at the same location, as shown in Table (3).

Test Validity

Test validity depends on the extent to which the test is capable of accurately measuring the targeted skill or attribute. A test is considered valid when it adequately and accurately measures the phenomenon for which it was designed (Hermanzoni et al., 2025). In this study, the researchers used face validity by consulting a panel of experts and specialists. The pilot forms prepared to determine the skill tests for the research sample were presented to them. After the researchers had prepared several tests, these tests were submitted to the experts and specialists for review and evaluation. Based on their feedback, the forms were examined, and the percentage of agreement among them was calculated, as shown in Table (3).

Test Objectivity

One of the most important characteristics of a good test is that it should be objective in measuring the targeted phenomenon, and that all tested individuals should fully understand what is required of them, with clear instructions that leave no room for misinterpretation or deviation from the intended meaning. In its general sense, objectivity implies freedom from bias and prejudice, and the prevention of personal factors from influencing the results (Laakso, J. (2024). The researchers estimated test objectivity by calculating the

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correlation between the scores given by two raters who evaluated the performance of the same group of individuals over the same period of time (Bisagno et al., 2019). Based on the statistical analysis of the results, it was found that all tests possessed a high level of objectivity, as shown in Table (3).

Table 3: Percentage of agreement among experts and specialists, and the values of reliability and objectivity coefficients

Test	Unit of measurement	Experts' agreement (%)	Reliability coefficient	Objectivity coefficient
Tennis serve accuracy	Degree	100%	0.92	0.91
Spike accuracy	Degree	100%	0.92	0.90
Block accuracy	Degree	80%	0.90	0.88

Main Procedures

The main procedures were as follows:

Pre-tests:

The pre-tests were administered to the research sample on 14/10/2023. The researchers and the assisting team ensured that conditions were appropriate, that the method of administration was suitable, and that the sequence of tests was properly organized.

Instructional Program

The researchers implemented the proposed instructional program on the research sample during regular physical education lessons, in the period from 6 October 2023 to 26 October 2023, at a rate of two instructional units per week. Each unit lasted 90 minutes, which is the standard time allocated for practical lessons according to the curriculum for intermediate schools in Iraq and in line with the specifications of the Ministry of Education. The proposed instructional program was initially designed to include a set of teaching units based on a divergent-thinking problem-solving strategy, which consists of five main steps summarized as follows:

1. Identifying the problem.
2. Defining the problem.
3. Collecting facts and information related to the problem.
4. Generating hypotheses that propose solutions to the problem.
5. Implementing the ideas and testing the validity of the proposed solutions.

In contrast, the control group followed the traditional curriculum based on the demonstration method. The program consisted of 32 instructional units, distributed equally between the traditional demonstration method and the divergent-thinking problem-solving strategy, with 16 units for each. The program focused on three types of shooting: free-throw shooting, jump shooting, and lay-up shooting. The researchers derived the content of the instructional units from a set of relevant studies and references, including the curricula of the Ministry of Education and official documents for the intermediate stage. These sources helped provide guidelines that enhance the teacher's ability to design varied instructional content compatible with the nature of applying the divergent-thinking strategy and its steps in an effective and innovative manner.

Post-tests

After applying the motor coordination exercises to the experimental group and completing the instructional units, the researcher administered the post-tests to both the experimental and control groups on 11/12/2023. The same accuracy tests related to the skills under study were used, following the same procedures adopted in the pre-tests. The researcher also ensured that the same spatial and temporal conditions were maintained and that the same tools and equipment used in the pre-tests were employed in the post-tests.

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Statistical Methods

The researchers used the following statistical methods:

- Arithmetic mean
- Standard deviation
- Percentage (%)
- Coefficient of variation
- Simple correlation
- t-test for two related means
- t-test for two independent means

Results

Presentation, Analysis, and Discussion of the Results

To examine the differences between the pre- and post-tests for both the experimental and control groups, as well as the differences between the two groups in the post-tests, the researchers implemented coordination exercises for the experimental group. After completing these exercises, the data were collected and organised into tables, then subjected to the appropriate statistical treatments. This enabled the researchers to compare the outcomes with the study hypotheses.

Presentation and analysis of the differences between the pre- and post-tests for the control and experimental groups

1. Presentation and analysis of the differences between the pre- and post-tests for the control group

Table 4: Arithmetic means, standard deviations, and calculated t-values between the pre- and post-tests for the control group

Tests	Unit of measurement	Pre-test		Post-test		Calculated t-value
		M	SD	M	SD	
Tennis serve accuracy	Degree	10.77	1.89	15.82	1.47	3.87
Spike accuracy	Degree	9.39	2.10	14.98	1.69	4.22
Block accuracy	Degree	5.81	1.76	9.65	1.94	4.25

From Table (4), which shows the pre- and post-test results for the control group, it is evident that there are statistically significant differences between the pre- and post-tests in favor of the post-tests. All calculated t-values are greater than the tabulated t-value of 2.09 at the 0.05 significance level and 19 degrees of freedom.

Presentation and analysis of the differences between the pre- and post-tests for the experimental group

Table 5: Arithmetic means, standard deviations, and calculated t-values between the pre- and post-tests for the experimental group

Tests	Unit of measurement	Pre-test		Post-test		Calculated t-value
		M	SD	M	SD	
Tennis serve accuracy	Degree	11.02	1.36	17.14	1.33	5.91
Spike accuracy	Degree	9.93	1.71	17.48	1.67	5.67
Block accuracy	Degree	6.12	1.54	10.65	1.50	6.26

Tabulated t-value = 2.09 at the 0.05 significance level and free 19 degrees.

From Table (5), which presents the pre- and post-test results for the experimental group, we observe statistically significant differences between the pre- and post-tests in favor of the post-tests. All calculated t-values are greater than the tabulated t-value of 2.09 at the 0.05 significance level and 19 degrees of freedom.

Presentation and analysis of the differences between the control and experimental groups

Table 6: Arithmetic means, standard deviations, and calculated t-values for the post-tests of the control and experimental groups

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Tests	Unit of measurement	Control		Experimental		Calculated t-value
		M	SD	M	SD	
Tennis serve accuracy	Degree	15.82	1.47	17.14	1.33	5.31
Spike accuracy	Degree	14.98	1.69	17.48	1.67	4.84
Block accuracy	Degree	9.65	1.94	10.65	1.50	4.62

Tabulated t-value = 2.02 at the 0.05 significance level and free 38 degrees.

From Table (6), which presents the post-test results of the control and experimental groups, it is clear that there are statistically significant differences between the two groups in favor of the experimental group. All calculated t-values are greater than the tabulated t-value of 2.02 at the 0.05 significance level and 38 degrees of freedom, indicating the superiority of the experimental group that was taught using the problem-solving strategy.

Discussion of the Results

The researchers attribute the effectiveness of the problem-solving strategy in improving skill learning to the fact that it is one of the modern scientific approaches that places the learner at the center of the educational process. This approach enhances learners' motivation by providing sufficient time for practicing skills, presenting information, and correcting errors, as well as offering greater opportunities for practice and deep skill development. Instructional units structured in a way that requires learners to produce a variety of responses within multiple categories and different frameworks have a positive impact, as they foster participation and encourage the expression of ideas. This is consistent with what Abdel-Sattar Ibrahim indicated regarding the enhancement of cognitive fluency by stimulating learners to generate multiple responses related to a specific topic, which in turn increases their ability to face challenges and solve problems autonomously. The group taught using the problem-solving strategy showed substantial improvement in the proposed three-point scoring skill, and demonstrated an ability to present interconnected ideas and move away from rigid, traditional patterns of thinking. Learners became more capable of exploring information independently and engaging in mental processes such as planning, decision-making, and drawing inferences. This strategy offers learners the opportunity to delve deeply into possible solutions rather than resorting to stereotypical answers, and it encourages the search for new and original ideas. Recent studies, as reported by Mitchell, Oslin and Griffin (2020), emphasize that this approach requires the teacher to train students to restructure their thinking, broaden their perspective on possible solutions, and encourage them to search for varied and creative responses instead of relying solely on conventional ones. The problem-solving strategy thus reveals learners' capacity to generate innovative and unfamiliar solutions, which motivates them to explore new horizons in thinking. Panatier (2022), and Ali and Kasim (2022) also stresses the importance of encouraging new ideas through constructive feedback and sustained dialogue that brings out different perspectives on proposed solutions. This method has helped students to develop creative thinking skills and enhance their analytical and expressive abilities. The findings of the present study are largely in line with previous research, such as the studies of Batez et al (2021), Salam and Obaid (2025), and Patsiaouras et al. (2025), which reported that the problem-solving strategy has a positive effect on skill learning, particularly in activities and games that require repetition and sufficient time to master. An analysis of the results in Table (4) shows that the calculated t-values for all skill tests exceeded the tabulated values, indicating statistically significant differences in favor of the post-tests for the control group. This supports the first hypothesis of the study. The researchers attribute this improvement to the regular attendance of students in the instructional units included in the enriched curriculum prepared by the school, as well as to motivation, which is a key factor in enhancing the learning process. The research team also links this improvement to the consistent participation of the control group and their adherence to the lessons delivered according to the prescribed

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curriculum under the supervision of the research team. According to Li et al (2024), the level of learning is directly proportional to the degree of student motivation. This interaction contributed to a form of adaptation among students, leading to improved levels of motor and perceptual anticipation. Furthermore, this improvement is attributed to the careful organization of content by the teacher and the engaging way in which skills were presented. The teacher supported the learning process with practical demonstrations that clarified the details of the skills, their critical phases, and technical aspects. Continuous guidance and immediate correction of learners' errors also played a key role in enhancing performance. These findings are consistent with several previous studies such as D'Isanto et al (2025), Mussema, Tadesse and Melkamu (2021), and Keoliya et al(2022) other studies conducted in 2024 and 2025, which indicated that well-structured programs for control groups lead to noticeable improvement in results when compared with initial measurements. Those studies also showed that through practice and repeated attempts, individuals learn how to anticipate regular changes and respond to them effectively, which contributes to higher levels of performance. The research team further notes that the demonstration method plays an important role, especially in the early stages of learning and with beginners who are still acquiring basic motor skills. This method is characterised by providing a large amount of information to students and helps teachers manage large class sizes. However, the results of the present study showed that the level of improvement achieved through this method did not surpass that achieved by the problem-solving strategy. This finding aligns with earlier research, such as Bucea-Manea-Țoniș (2022), and de Andrade Rodrigues et al (2021) which confirmed the importance of learner-centered teaching methods that actively involve students in the learning process in order to achieve better educational outcomes. The results obtained from Table (6) indicate that the calculated t-values for all skill tests exceeded the tabulated t-value, which demonstrates the presence of statistically significant differences in favor of the experimental group. These differences reflect the marked improvement in scoring skills among the members of the experimental group, and this development is attributed to the teaching approaches adopted, which showed varying positive effects. According to the research team, the use of the problem-solving strategy effectively contributed to placing the learner at the centre of the educational process instead of the teacher. In this context, the teacher relied on presenting stimulating questions in the form of problems or tasks, asking learners to provide multiple solutions by designing sequences of basic movements to construct the required skill, which motivated them to perform in a varied and creative manner. This approach helps learners gradually move away from traditional patterns of thinking and encourages them to generate innovative and diverse motor responses, thereby enriching the range of ideas and perspectives. It also strengthens their ability to compare similar situations and identify points of similarity between different topics. From this standpoint, adopting the problem-solving strategy led students to shift from a traditional learning pattern restricted to receiving information presented by the teacher, to a pattern based on inquiry and independent selection of appropriate solutions. This, in turn, encouraged them to interact more positively with the strategy, as it enhanced their abilities, revealed their potential, and increased their sense of enthusiasm and engagement. The researchers concur with Parente, Ginciene and Impolcetto (2020), and Jabbar and Kasim (2023) who states that this approach is based on reaching the correct solution through examining multiple possibilities and answers. In this way, learners are given the opportunity to employ rational thinking to analyses situations and respond to questions related to the required skill, enabling them to learn through self-directed exploration. Several researchers, such as Bueza et al (2023), Turan and Koç (2018), Grandison (2024), and Sanchez-Gil-Machín et al (2024), have reported statistically significant differences between the experimental and control groups, emphasizing that the problem-solving strategy supports the development of self-directed learning in line with the learner's own pace and significantly enhances scientific thinking. Ferriz-Valero et al (2022) also highlights the effectiveness of an instructional program based on the problem-solving strategy in teaching various basic

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volleyball skills to second-grade intermediate students. The elements embedded in this strategy such as increasing interest, motivation, and curiosity towards learning, as well as creating an environment that encourages self-construction and active participation contribute to promoting learners' appropriate engagement with the game in terms of motor-skill performance in general, and scoring skills in particular, and in finding solutions to the situations associated with them. The findings of the present study are consistent with previous research indicating that the problem-solving strategy plays an important role in developing motor and skill performance.

Conclusions

In light of the results obtained, the researchers concluded the following:

1. The problem-solving strategy had a positive effect on the accuracy of the volleyball skills under investigation.
2. The problem-solving strategy used in the instructional units accompanying performance played an effective role for the members of the experimental group.
3. The experimental group outperformed the control group in developing the accuracy of the volleyball skills under study.

Recommendations

The researchers recommend the following:

1. Physical education teachers should adopt the problem-solving strategy to teach and develop the basic volleyball skills, with particular emphasis on improving their accuracy.
2. Time should be allocated within the volleyball instructional unit at the intermediate stage to incorporate the problem-solving strategy, due to its importance in developing the accuracy of motor skills.
3. Regular and continuous tests of mental abilities should be conducted for physical education students in order to identify their actual level and then work on developing these abilities.
4. Similar studies should be carried out on other volleyball skills and on skills in different games and sport events, in order to determine the importance of focusing attention on various sporting activities and their impact on motor and skill performance.

References

1. Abdul-hasan, S. A., & Abdul-samea, H. (2023). The effect of the Listening Triangle on improving the learning of serving and reception skills in volleyball among fifth-grade female preparatory students at the Directorate of Education Baghdad Karkh I. *Modern Sport*, *22*(3), 19-31.
2. Ahmed, Z. J., & Hamoodi, L. S. (2021). Pivotal thinking and its relationship to the performance of the skills of preparing and receiving serve volleyball for female students. *Annals of the Romanian Society for Cell Biology*, *25*(6), 7950-7958.
3. Ali, H. F. S., & Kasim, M. A. (2022). The Effect Of An Educational Curriculum Using The Jigsaw Strategy To Learning Skills Of Volleyball For Secondary School Students. *European Journal of Interdisciplinary Research and Development*, *9*, 160-168.
4. Ali, H. F. S., & Kasim, M. A. (2022). The effect of using the cooperative learning and blended learning method in improving the level of students performance in learning volleyball for secondary school students. *American Journal of Interdisciplinary Research and Development*, *11*, 231-242.
5. Apidogo, J. B., Burdack, J., & Schöllhorn, W. I. (2021). Repetition without repetition or differential learning of multiple techniques in volleyball?. *International Journal of Environmental Research and Public Health*, *18*(19), 10499.

Proximus Journal of Sports Science and Physical Education
Volume 2, Issue 12, December, 2025
https://proximusjournal.com/index.php/PJSSPE
ISSN (E): 2942-9943

6. Awaluddin, A., Samsudin, S., Puspitorini, W., Widiastuti, W., & Syahruddin, S. (2025). A Comprehensive Approach to Enhancing Volleyball Skills: The Role of Problem-Based Learning, Constraint-Led Approach, and Motivation. *Physical Education Theory and Methodology*, *25*(3), 548-555.
7. Batez, M., Petrušič, T., Bogataj, Š., & Trajković, N. (2021). Effects of teaching program based on teaching games for understanding model on volleyball skills and enjoyment in secondary school students. *Sustainability*, *13*(2), 606.
8. Bisagno, E., Morra, S., Basciano, M., Rosina, C., & Vitali, F. (2019). Assessing individual performance in team sports: A new method developed in youth volleyball. *Journal of Functional Morphology and Kinesiology*, *4*(3), 53.
9. Bucea-Manea-Țoniș, R., Vasile, L., Stănescu, R., & Moanță, A. (2022). Creating IoT-enriched learner-centered environments in sports science higher education during the pandemic. *Sustainability*, *14*(7), 4339.
10. Bueza, J. P., Vallejo, T. J. O., Flores, H. M., & Rodriguez, M. T. M. (2023). Effectiveness of Self-Made E-Learning Videos for Dual Sports in Enhancing The Performance of Bachelor of Physical Education Students. *Education Policy and Development*, *1*(2), 53-65.
11. Coutinho, P., Ribeiro, J., da Silva, S. M., Fonseca, A. M., & Mesquita, I. (2021). The influence of parents, coaches, and peers in the long-term development of highly skilled and less skilled volleyball players. *Frontiers in Psychology*, *12*, 667542.
12. D'Isanto, T., Karçurri, A., Kasa, A., Di Lascio, G., & D'Elia, F. (2025). New training method approach on perception-awareness to improve sport performance on volleyball athletes. *International Journal of Kinesiology & Sports Science*, *13*(1), 64.
13. de Andrade Rodrigues, H., Brasil, V. Z., Milistetd, M., & Trudel, P. (2021). Learner-centered teaching in a Higher Education course: a case study with a recognized researcher in Sports Coaching. *Research, Society and Development*, *10*(3), e44910313568-e44910313568.
14. De Biasi, A. (2020). *The Interplay of Talent and Discipline: A Study of the Experience of Elite Italian Volleyball Players* (Doctoral dissertation, Fielding Graduate University).
15. Ferriz-Valero, A., Østerlie, O., García-Martínez, S., & Baena-Morales, S. (2022). Flipped classroom: A good way for lower secondary physical education students to learn volleyball. *Education Sciences*, *12*(1), 26.
16. Giatsis, G., & Tilp, M. (2022). Spike arm swing techniques of olympics male and female elite volleyball players (1984-2021). *Journal of sports science & medicine*, *21*(3), 465.
17. Grandison, L. A. (2024). *Using Self-Regulated Learning to Increase Academic Performance in NCAA Student-Athletes* (Doctoral dissertation, Walden University).
18. Hermanzoni, H., Rifki, M. S., Ilham, I., Ariston, A., Hanifah, R., Orhan, B. E., ... & Geantă, V. A. (2025). A comprehensive instrument for evaluating advanced volleyball techniques in sport science students: design, reliability, and validity. *Retos*, *62*, 379-387.
19. Hussein, A. T., & Kasim, M. A. (2022). The Effect Of Applying The Strategy Of Educational Scientific Pillars On The Level Of Performance Of Some Handball Skills Among Players Misan University. *American Journal of Research in Humanities and Social Sciences*, *15*, 51-63.
20. Ibrahim, F. S., & Ulaiwi, A. H. (2024). The effect of the mastery learning strategy on the mental toughness and skill performance of receiving the serve in volleyball for students. *Modern Sport*, *23*(5), 351-366.

Proximus Journal of Sports Science and Physical Education
Volume 2, Issue 12, December, 2025
https://proximusjournal.com/index.php/PJSSPE
ISSN (E): 2942-9943

21. Jabbar, Q. M., & Kasim, M. A. (2023). Social adaptation and psychological adjustment and their relationship to defensive skills in volleyball for the Premier League. *European Journal of Interdisciplinary Research and Development*, *12*, 134-143.
22. Jiao, Y. (2024). Exploration of Teaching and Training Methods for College Volleyball Based on Competition Mode. *Frontiers in Sport Research*, *6*(1).
23. Keoliya, A. A., Ramteke, S. U., Boob, M. A., Somaiya, K. J., & Keoliya, A. (2024). Enhancing volleyball athlete performance: A comprehensive review of training interventions and their impact on agility, explosive power, and strength. *Cureus*, *16*(1).
24. Keoliya, A. A., Ramteke, S. U., Boob, M. A., Somaiya, K. J., & Keoliya, A. (2024). Enhancing volleyball athlete performance: A comprehensive review of training interventions and their impact on agility, explosive power, and strength. *Cureus*, *16*(1).
25. Kumar, A. S. (2018). Effect Of Training Surface On Coordination Motor Abilities And Passing Skills Of Women Volleyball Players. *Ganesar College Of Arts And Science*, 333.
26. Laakso, J. (2024). Implementation of good governance and safe environment in sports: case: Finnish volleyball league.
27. Li, X., Wang, D., Gao, S., & Zhou, C. (2024). Impacts of kinematic information on action anticipation and the related neurophysiological associations in volleyball experts. *Brain Sciences*, *14*(7), 647.
28. Li, Y. (2025). Structural modelling of student volleyball athletes' intimacy, social adjustment, perceived stress, and learning-related anxiety: mediating role of psychological safety. *BMC psychology*, *13*(1), 15.
29. Mitchell, S. A., Oslin, J. L., & Griffin, L. L. (2020). *Teaching sport concepts and skills: A tactical games approach*. Human kinetics.
30. Mussema, A., Tadesse, T., & Melkamu, Z. (2021). Program quality and developmental outcomes related to youth volleyball in Ethiopia: assessing relationships and variations. *European Journal of Investigation in Health, Psychology and Education*, *11*(4), 1388-1405.
31. Naderi, A., Shahrokhi, H., ChoromZadeh, H., & Ebrahimi, E. (2025). Reliability and validity of the Persian version of the Victorian Institute of Sport Assessment-Patella (VISA-P) Questionnaire. *Journal of Orthopaedic Surgery and Research*, *20*(1), 1046.
32. Oliinyk, I., Doroshenko, E. Y., Melnyk, M., Sushko, R., Tyshchenko, V., & Shamardin, V. (2021). Modern approaches to analysis of technical and tactical actions of skilled volleyball players.
33. Panatier, J. C. (2022). *Thriving under pressure: Exploring resilience through a collegiate volleyball lens*. University of La Verne.
34. Parente, T. A., Ginciene, G., & Impolcetto, F. M. (2020). Volleyball in school physical education and student difficulties: analysis based on tactical principles. *Journal of Physical Education and Sport*, *20*(5), 2945-2951.
35. Patsiaouras, A., Tsetsilas, K., Politi, E., & Charitonidis, K. (2025). Exploring the Resilience–Performance Relationship in Volleyball Players: A Pilot Study on Problem-Solving Strategies. *Baltic Journal of Sport and Health Sciences*, *1*(134), 22-33.
36. Ramos, A. G. A. (2021). *Integrating Constraint-led and Step-Game approaches to develop sport performance: a season-long action-research study of a youth volleyball team* (Doctoral dissertation, Universidade do Porto (Portugal)).
37. Salam, A., & Obaid, H. (2025). The effect of the concentration strategy for serious creativity on productive thinking, performance and accuracy of volleyball transmission skill among students. *Journal of Physical Education (20736452)*, *37*(1).

Proximus Journal of Sports Science and Physical Education
Volume 2, Issue 12, December, 2025
https://proximusjournal.com/index.php/PJSSPE
ISSN (E): 2942-9943

38. Saleh, H. F. (2025). The effect of using some educational aids in learning the skill of receiving volleyball transmitters for students of the second stage of the Faculty of Physical Education and Sports Sciences. *University of Thi-Qar Journal for Sciences of Physical Education*, *2*(2), 208-215.
39. Sanchez-Gil-Machín, R., Baena Morales, S., Molina-García, N., & Ferriz-Valero, A. (2025). Impact of feedback in flipped learning on the development of soft skills of university students. *Education Sciences*, *15*(1), 63
40. Sgrò, F., Barca, M., Schembri, R., Coppola, R., & Lipoma, M. (2022). Effects of different teaching strategies on students' psychomotor learning outcomes during volleyball lessons. *Sport Sciences for Health*, *18*(2), 579-587.
41. Silva, B. V. F. D., Santos, R. H. D., Savarezzi, G. R., Souza, M. T. D., & Gimenez, R. (2020). Teaching strategies in physical education: a confrontation between directive and indirective styles in volleyball learning. *Journal of Physical Education*, *31*, e3168.
42. Tabynbayev, A. (2025). The Role Of The Coach In Forming A Successful Volleyball Team. *EduVision: Journal of Innovations in Pedagogy and Educational Advancements*, *1*(3), 39-57.
43. Turan, M. B., & Koç, K. (2018). The Impact of Self-Directed Learning Readiness on Critical Thinking and Self-Efficacy among the Students of the School of Physical Education and Sports. *International Journal of Higher Education*, *7*(6), 98-105.
44. Yeri, B. E. D. V. Ö. (2024). The Place and Importance of Volleyball Teaching in Physical Education Classes. *IJOSS*, *1*(1), 12-18.