



Information Article

The Effect of Kinesthetic Perception Exercises on Learning Passing and Catching Skills in Handball for Intermediate School Students

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ARTICLE INFO ABSTRACT

Keywords:

Kinesthetic perception exercises, Motor skill acquisition, Passing and catching, Handball, Physical education.

The present study aimed to investigate the effect of kinesthetic perception exercises on the acquisition and learning of passing and catching skills in handball among intermediate school students.

The study sample was drawn from the target population of first-grade intermediate male students affiliated with the General Directorate of Education in Diyala during the academic year 2025/2026. The total sample comprised N = 72 students, providing a statistically representative and valid proportion of the population. Participants were randomly assigned into two equal groups: an experimental group (n = 36) subjected to kinesthetic perception exercises, and a control group (n = 36) following the conventional pedagogical curriculum. Pre- and post-tests were administered to assess performance in handball passing and catching skills.

The formulated hypotheses were confirmed, demonstrating statistically significant differences ($p < 0.05$) between the pre- and post-test assessments for both groups, with superior motor performance and skill proficiency favoring the post-test results of the experimental group.

Conclusions: The implemented kinesthetic exercises significantly enhanced learners' intrinsic motivation by fostering a structured competitive learning environment.

Recommendations: It is highly recommended to integrate specialized auxiliary tools and instructional pedagogical aids during the fundamental motor learning stages of team sports.

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1. Introduction

Sensorimotor perception is regarded as one of the primary cognitive skills that plays a significant role in perceiving, conceptualizing, clarifying, and executing motor activities within the context of the environment and society in which such activities take place. Sensorimotor perception is particularly important for the execution of handball passing and receiving skills, as it involves the perception of distance, timing of performance, and awareness of the ball. Accordingly, it represents an essential prerequisite for mastering fundamental skills and improving the level of performance.

Sensorimotor perception is also considered an important and dynamic factor that can influence motor performance. Its application contributes to refining performance through the mental analysis and accurate representation of the skill, while also reducing errors by enabling the performer to visualize the appropriate technique for execution. Furthermore, sensorimotor perception of a motor skill assists the player in performing the skill smoothly and in understanding the nature and requirements of its execution. This, in turn, brings the player's performance closer to the demands of successful motor execution and provides greater opportunities to select appropriate methods of gaining a competitive advantage, develop suitable tactical strategies, and make accurate responses during competition.

Against this background, the significance of the present study lies in developing sensorimotor perception exercises based on scientifically established and systematically designed principles for teaching the passing and receiving skills in handball among first-grade students at Noor Al-Haq Mixed Intermediate School. The study also seeks to address the deficiencies observed in these skills in a manner that may contribute to improving the development of handball in the future.

In recent years, handball has received considerable attention from international sporting communities and organizations concerned with its development. This growing interest has been reflected in the noticeable advancement of performance in international competitions, particularly in terms of players' technical proficiency, creativity, and overall performance levels. Such development has not been confined to a particular level; rather, handball has continued to gain increasing popularity and wider participation across countries.

Handball is considered a sport that has developed relatively recently in its modern organized form. Its practice may greatly benefit from the effective utilization of cognitive capabilities through contemporary scientific approaches. Sensorimotor perception plays a fundamental role in enabling players to recognize the position and orientation of their bodies, whether during movement or in a state of stability. It also constitutes a fundamental basis for acquiring knowledge and assigning meaning to various sensory inputs and stimuli. The sensory and nervous systems are the principal systems involved in this process, and their integrity and degree of functional development influence the process of perception. On this basis, the researcher addressed this skill within handball, based on the premise that the specifically designed exercises would contribute to learning the targeted skill and improving the students' skill level, thereby contributing to the development of handball in Iraq.

Research Problem

The research problem concerns the importance of teaching handball skills to novice learners in a manner that enables students to attain an appropriate level of skill acquisition. Scientific advancement plays a direct and influential role in supporting the





educational process through various approaches and means that assist both teachers and learners in facilitating, accelerating, and improving performance in pursuit of the intended educational objectives. It also encourages the use of supportive methods because of their important role in increasing the effectiveness of learners' participation while promoting the efficient use of effort and time, in line with the rapid developments taking place in teaching and learning processes.

Based on the researcher's experience in the field of handball, it was observed that the learning and development of handball skills are not being achieved at an appropriate level when compared with the progress made in teaching and developing the sport at the Arab, Asian, and international levels. This observation was based on the practical implementation of training activities and the outcomes achieved.

The importance of school-based physical education lies in its role as the first stage in establishing a sound sequence of skill development. As the researcher is a physical education teacher, this prompted him to observe the process of learning the passing and receiving skills in handball during physical education lessons. The researcher observed that the exercises used to teach these skills lacked sufficient elements of interest and motivation, which are considered essential factors in encouraging learners to engage actively in practice and execution. The exercises also lacked appropriate use of equipment and instructional aids. Furthermore, although handball is a team sport, the exercises being implemented did not adequately promote or develop the spirit of teamwork and collaborative participation among learners.

Therefore, the researcher sought to employ a set of sensorimotor perception exercises to facilitate the learning of selected handball passing and receiving skills among intermediate school students, as an attempt to identify an effective method for enabling students to acquire these skills in an appropriate and effective manner.

Research Question

The research problem can be summarized in the following question:

Does the application of sensorimotor perception exercises have an effect on students' learning of the handball passing and receiving skills?

Research Objectives

The study aims to:

1. Identify the role of sensorimotor perception exercises in learning the handball passing and receiving skills among students.
2. Determine the effect of sensorimotor perception exercises on learning the handball passing and receiving skills among students.

Research Hypotheses

1. There are statistically significant differences between the pre-tests and post-tests of the experimental and control groups in the handball passing and receiving skills, in favor of the post-test results.
2. There are statistically significant differences between the post-test results of the experimental and control groups in the learning of the handball passing and receiving skills.

2. Research Methodology and Field Procedures

2.1 Research Method

Given the nature of the research problem, which necessitated the adoption of an experimental approach, this method was selected as it enables the researcher to control the conditions of the situation under investigation, except for the variable or variables





presumed to be responsible for producing a particular change under those conditions (Ahmed Khamis & Jameel Qasim, 2011, p. 44).

The researcher employed the experimental research method because it was considered appropriate for the nature of the study. Experimental research is an approach that seeks to control all essential factors influencing the dependent variables in an experiment, with the exception of one factor that is deliberately manipulated by the researcher in order to measure its effect on the dependent variable.

The experimental method is considered one of the approaches that enables researchers to obtain accurate results, as experimentation is among the most effective methods for obtaining reliable and scientifically supported knowledge.

2.2 Research Population and Sample

The research population consisted of first-grade intermediate school students at Noor Al-Haq Mixed Intermediate School, Diyala Directorate of Education, during the 2025–2026 academic year. The total number of students in the research population was 80, which was considered an appropriate number for adequately representing the population.

The sample was then randomly divided into two equal groups: 36 students constituted the control group, while 36 students constituted the experimental group.

Four students who had repeated the academic year or had deferred their studies, as well as students who were members of the school's handball team, were excluded from the study. In addition, four students who participated in the pilot study were excluded from the research results; however, they participated in the instructional unit as part of the physical education lesson.

2.3 Materials, Instruments, and Equipment Used

2.3.1 Materials and Instruments

To achieve the objectives of the study, a number of materials and instruments were used, including:

- A standard handball court.
- Six handballs.
- Chinese-made handballs.
- Chalk.
- Markers/cones.
- A Fox brand whistle.

2.3.2 Equipment

The equipment used in the study included:

- A computer.
- A digital electronic wristwatch.
- A Sony digital video camera (8 mm).

2.4 Test Used in the Study

After reviewing a wide range of scientific sources and previous studies related to the subject of the research, as well as surveying the opinions of specialists in motor learning and handball training, in order to identify the most appropriate assessments for the passing and receiving skills under investigation and the exercises to be employed, the researcher followed a number of procedures to implement the study appropriately and achieve its objectives, as follows:

1. Identification of the handball passing and receiving skills in accordance with the curriculum prescribed by the Ministry of Education.



2. Preparation of suitable conditions for conducting the tests.
3. Conducting a pilot study of the tests on the sample excluded from the study groups.
4. Conducting a pilot study of the exercises on the research sample.
5. Preparing a data recording and tabulation form.

Test Name: Passing and Receiving Test (Dhiaa Al-Khayyat, 2013, p. 182).

Purpose of the Test: To assess coordination and the speed of passing the ball against a wall.

Equipment: Handball, wall, and stopwatch.

Test Procedure

The participant stands at a distance of 3 m from the wall and repeatedly passes the ball against the wall for the maximum possible number of passes within the specified time of 30 s, as illustrated in Figure 1.

Scoring

The number of passes completed within the specified time is recorded, with each successful reception of the ball counted as one pass.

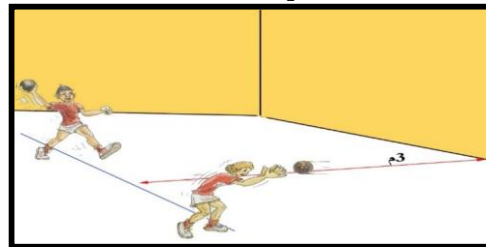


Figure 1. Passing and Receiving Test

2.5 Pre-Test Procedures

The pre-tests were conducted on the morning of Sunday, February 16, 2025, on the sports field of Noor Al-Haq Mixed School. The researcher standardized the testing conditions, test administration procedures, and the assisting research team to ensure, as far as possible, that the same conditions were maintained when conducting the post-tests.

The following procedures were followed:

1. Before administering the test, the participants were given a clear explanation and demonstration of the handball passing and receiving skill tests.
2. The students were given sufficient time to perform a complete warm-up.
3. The test procedure was demonstrated and implemented to ensure that all participants understood the requirements and performed the test correctly.
4. The results were recorded according to the specified requirements and characteristics of the test.

2.6 Equivalence of the Research Groups

The experimental and control groups were assessed for equivalence with respect to the handball skill tests (passing and receiving), based on the results of the pre-test, as presented in Table 1.

Table 1. Analysis of Variance, Including the Source of Variation, Sum of Squares, Degrees of Freedom, Mean Square, Calculated and Critical F Values, and Significance Level for Establishing the Equivalence of the Research Groups in the Pre-Test of the Handball Passing and Receiving Skill

Variables	Sum of Squares	df	MS		Calculated F	Sig.
Passing & Receiving	44,967	3	14,989	2,7	1,663	NS
	1045,4	116	9,012			





2.7 Implementation of the Main Experiment

The main experiment was conducted with the research participants from Wednesday, February 20, 2025, to Wednesday, April 22, 2025. The experimental group participated in two instructional units per week, conducted on Mondays and Wednesdays, for a total of 18 instructional units. Each instructional unit lasted 40 min and was divided into three sections, as presented in Table 2.

The researcher focused on the main section of each instructional unit, which lasted 25 min, during which the exercises were applied to the experimental and control groups by the physical education teacher at Noor Al-Haq Mixed School.

Table 2. Sections of the Instructional Unit, Their Duration, and Their Percentages within the Educational Program for the Experimental Groups

No.	Instructional Unit Sections	Time per Unit (min)	Total Program Time (min)	Percentage (%)
1	Preparatory Section	10	170	% 10
	Introduction & Warm-up	5	85	% 5
	Physical Exercises	5	85	% 5
2	Main Section	25	425	% 30
	Instructional Component	10	170	% 10
	Practical Component	15	255	% 20
3	Concluding Section	5	85	% 7
	Small-Sided Game	4	68	% 7
	Dismissal	1	17	% 6
	Total	40	680	% 100

2.8 Post-Test Procedures

The researcher conducted the post-tests after completion of the educational program and its 18 instructional units on Tuesday, April 22, 2025, while maintaining the same conditions, requirements, and testing procedures adopted during the pre-tests.

2.9 Statistical Methods

Appropriate statistical methods were employed to analyze the data obtained from the pre- and post-tests using the Statistical Package for the Social Sciences (SPSS).

3. Presentation and Discussion of the Results

3.1 Presentation and Discussion of the Results of the Pre- and Post-Tests of the Passing and Receiving Skills in the Research Groups

3.1.2 Discussion of the Results of the Pre- and Post-Tests of the Passing and Receiving Skills in the Research Groups

The exercises employed by the researcher encouraged the learners to increase their effort by challenging themselves and, in some cases, competing with others. Challenge is considered a reinforcing component whose effects are reflected in learning and behavior. This is supported by Abdul Razzaq Kadhimi et al. (2012, p. 59), who indicated that developing skills through challenge constitutes one of the approaches that increases learner motivation and represents an important factor in improving the efficiency of motor-skill performance during the lesson.

Furthermore, introducing variation in the characteristics of the exercise, the performance format, or its objective contributes to increasing enjoyment and entertainment during practice, thereby encouraging students to engage more actively in the learning process. This view is consistent with that of Emad Al-Din Abbas and Medhat Mahmoud (2007, p. 122).



For effective acquisition of fundamental skills, learning should, whenever possible, be presented in a competitive and enjoyable format that incorporates variation and change rather than repetitive performance using an identical form and method. Such natural variation can have a positive effect on sustaining students' attention and interest in learning.

Repeated practice also had an important and evident effect on skill development, as repetition contributes to modifying the course of motor performance and progressively improving execution toward higher levels of achievement. This finding is consistent with Furat Jabbar and Haval Khurshid (2011, p. 187), who emphasized that learning progresses through repeated practice, allowing the learner to develop an increasingly accurate perception of the movement trajectory until reaching a higher level of performance and achievement.

The exercises implemented by the researcher enabled the students to become aware of the outcomes of their performance after each exercise, which contributed to reinforcing correct responses and, consequently, supported the acquisition of motor skills. Schmidt (1999) argued that knowledge of results contributes to learning by enhancing learners' concentration and motivation, increasing their confidence in the learning outcomes, and encouraging them to direct their efforts toward achieving better performance. This, in turn, contributes to longer retention of the learned material.

Furthermore, feedback and the correction of skill-related errors that occurred during the execution of the exercises had an important effect on learning the skill under investigation. This is consistent with the findings reported by Mahmoud Dawoud Al-Rubaie and Saeed Saleh Hamad (2010, p. 89).

Fundamental motor skills constitute the backbone of the training process, particularly during the stage of preparing a new generation of athletes, as correcting skill deficiencies at later stages becomes more difficult. An inadequately skilled player may also have difficulty controlling the ball and coordinating his or her movements. Moreover, the use of supportive equipment during exercises can play an important role in the learning process. Najah Mahdi Shalash and Mazen Abdul-Hadi (2010, p. 198) emphasized the importance of providing appropriate supportive tools and equipment during the training and learning process.

These supportive tools and devices can accelerate learning by enhancing the learner's sense of competence and self-confidence and by facilitating the development and improvement of motor and technical performance. They can also increase the learner's engagement and interest during practice. Accordingly, the availability of appropriate supportive equipment can have a positive and effective role in improving the acquisition and performance of fundamental skills.

3.2 Presentation and Discussion of the Results of the Post-Tests of the Passing and Receiving Skills in the Research Groups

Table 4. Median, Quartile Deviation, and Mann–Whitney U Test Results for the Post-Test Scores of the Passing and Receiving Skills in the Research Groups

Skill	Statistical Parameters	Experimental Group		Control Group		t-value	Significance
		M	SD	M	SD		
Passing and Receiving	Passing from Head Level to a Flat Wall for 30 s from a Distance of 3 m	28	1.75	29	0.75	18.5	Seg.





3.2 Presentation of the Results of the Post-Test of the Passing and Receiving Skills

Table 4 presents the results of the post-test of the passing and receiving skills.

3.2.1 Discussion of the Results of the Post-Tests of the Passing and Receiving Skills in the Research Groups

The application of exercises appropriate to this age group contributed to increasing students' interest and engagement, enhancing enjoyment and reducing boredom during practice. Enjoyment of movement and motivational factors play an important role in the process of learning and mastering motor skills. In addition, the implementation of exercises appropriate to the students' developmental stage contributed to improving their control over the exercises and, consequently, increasing their confidence in their performance. Self-confidence is one of the important factors contributing to superior skill performance.

Improved performance in passing and receiving requires the player to recognize the appropriate distance between himself or herself and a teammate. Accurate perception of the distance during passing and receiving plays a fundamental role in facilitating the rapid acquisition and mastery of the skill. The improved perceptual awareness developed during passing and receiving can therefore be regarded as a consequence of implementing exercises appropriate to the learners' age and skill level (Dhiaa Qasim Al-Khayyat & Nawfal Mohammed Al-Hayali, 2001, p. 132).

4. Conclusion

Based on the findings of the study, it was concluded that the exercises employed in the present research increased learners' motivation toward learning by enhancing competition, which served as a reinforcing factor for performance. The sensorimotor perception exercises implemented by the physical education teacher also had an important effect on learning the skills investigated in the study.

In light of these findings, the researcher recommends adopting sensorimotor perception exercises and disseminating them among physical education teachers for use in physical education and sports science lessons, given their positive effect on learning fundamental handball skills. The researcher also recommends organizing professional development courses for school teachers to familiarize them with modern instructional approaches for helping students acquire fundamental handball skills.

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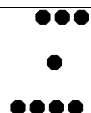
Educational Unit Appendix

Grade: First Intermediate Grade Educational Objectives Learning Objectives

Place: Noor Al-Haq Mixed School 1. Instilling a spirit of competition with sportsmanship

1. Developing physical qualities

Duration: 45 minutes 2. Instilling a spirit of cooperation among learners 2. Learning the skill of passing and receiving

Sections of the Educational Unit	Time	Behavioral Objectives	Physical Activity	Arrangement and Organization	Equipment and Tools	Notes
Preparatory Section	5	1. The student should adhere to the instructions when going out to the playground. 2. The student should maintain order.	Preparing the equipment, having the students stand in position, and performing the greeting.		- Command - Whistle	- Ensuring that the requirements of the educational unit are prepared and maintaining calmness and discipline. - The warm-up should serve the main section.
	5	1. The student should reach a state of proper warm-up of the functional body systems. 2. The exercise should be performed correctly and in an orderly manner. 3. The students should perform the physical exercises in response to the signal. 4. The students should develop the components of health-related physical fitness.	Walking – jogging – jogging while rotating the arms – jogging while touching the hips with the feet – normal jogging – walking while raising the hands upward to inhale – stretching exercises for the muscles and joints of the body.			
Warm-up and Physical Exercises	5	1. The student should learn to perform the passing and receiving skill. 2. The student should pay attention and concentrate on the sequence of the passing and receiving skill.	- A detailed explanation of the passing skill. - Performing the skill by the teacher. - Demonstrating the skill in parts. - Demonstrating the skill in its complete form.		- Balls	- Explaining the exercises carefully and thoroughly in front of the students.
	25	1. The student should learn to perform the passing and receiving skill. 2. The student should perform the passing and receiving skill correctly. 3. The student should master the performance of the passing and receiving skill. 4. The student should learn to move with a partner.	- Distributing the students according to the proposed method. - Performing the exercises related to the skill.		- Balls - Cones - Whistle	- Emphasizing correct performance and repetition. - Giving students rest periods and following the proper sequence in performing the exercise.
Concluding Section	5	a. A hopping race for a short distance. b. The students should compete with one another by running short distances. • The students should leave the playground calmly.	- A small recreational game. - Performing light jogging and stretching all parts of the body to return to the normal state.			- Maintaining activity at the end of the unit. - Maintaining calmness. - Returning the used equipment to its proper places.