



The Effect of Using Skill Exercises Based on Generative Learning on Learning and Retaining Handling and Shooting Skills in Handball for Students

Nassr Khalid Abdulrazzaq^{1*}, Saleh Ali dhash², Abbas Abdul Hamza Kazem³, Ali Yahya Abdulrzaq⁴

¹ College of Physical Education and Sports Sciences University of Anbar, Iraq.

<https://orcid.org/0000-0001-9969-6017>

^{2,4} Department of Student Activities, University of Anbar, Iraq.

³ College of Physical Education and Sports Sciences, University of Karbala, Iraq.

*Email: Pe.na_sport@uoanbar.edu.iq¹,

salaah.ali@uoanbar.edu.iq², abbas.abdulhamza@uokerbala.edu.iq³, ali.yahya.a@uoanbar.edu.iq⁴

Abstract. This research aims to identify the effect of using skill exercises based on generative learning in learning and retaining the skills of handling and shooting in handball among second-stage students at the College of Physical Education and Sports Sciences, Anbar University. The researchers used the experimental approach to suit the nature of the research, and the research sample consisted of the second stage students in the College of Physical Education, who numbered (80) students, and they were divided into two experimental groups that underwent a skill exercise program based on the foundations of generative learning, and a control that used the traditional method. Skill tests were applied before and after a retention period to measure the level of learning and retention of the two skills, and the program was applied for two months. The results showed that the experimental group significantly excelled in the skill performance tests and in the retention test, which indicates the effectiveness of skill exercises based on generative learning in enhancing students' learning and retention of basic skills in handball.

Keywords: : Handling Skill, Handball, Skill Exercises, Shooting Skill, Students, Learning.

1. INTRODUCTION

Handball, as a team sport, demands precise execution and a coordinated application of fundamental skills. Among the most crucial motor skills that players rely on to implement game strategies and achieve success are handling and shooting. Many physical education teachers face difficulties in enabling students to learn and retain these skills in the long term, as a result of relying on traditional methods that may not keep pace with the development of modern learning methods and do not suit the individual differences among students.

The educational process is currently an integrated system that seeks to develop the individual in various aspects, especially the skill, mental, and physical aspects. In this context, physical education is one of the vital fields that directly contributes to the development of motor skills and the development of students' mental and social abilities, through the practice of sports activities that promote the concepts of cooperation, discipline, and teamwork. Handball is a team sport that requires a high level of motor coordination,

speed of decision-making, and mastery of a set of basic skills that are the cornerstone of performance, including handling and aiming skills.

With the development of learning theories and teaching methods, it has become insufficient to rely on traditional methods of teaching motor skills, which often rely on mechanical repetition devoid of deep thinking or understanding. Therefore, modern trends in education have begun to focus on strategies that engage the learner effectively and give them a greater role in building and applying knowledge. One of the most prominent of these modern strategies is what is known as generative learning, which encourages the learner to create connections between new information and previous knowledge, through interpretation, summarization, representation, and cognitive reconstruction, contributing to the promotion of deep learning and the retention of information and skills for a longer period (Abdulrazzaq, n.d.; Mashaan & Abdulrazzaq, 2024).

Based on these concepts, this research came to investigate the impact of using skill exercises based on the principles of generative learning in improving the learning and retention of handball handling and shooting skills among students, aiming to enhance skill efficiency, raise the quality of educational practices in physical education lessons, and provide a more interactive and motivating training model for students.

The educational and mathematical literature indicates that the effectiveness of learning motor skills does not depend only on the quality of the skill but is greatly influenced by the quality of the educational strategies used in the teaching process. Handling and shooting skills are basic skills in handball that require high mastery and accuracy in performance, as well as cognitive and motor comprehension by the learner, which imposes the need for educational methods that combine theoretical knowledge with practical application.

Despite the importance of these skills, what is noticeable in the reality of educational practice is the adoption of traditional methods based on memorization and repetition, which often leads to a lack of learning skills and a weakness in retaining them over time. Hence, the need to employ modern strategies in learning, such as the generative learning strategy, which depends on involving the student in building knowledge and linking new information with previous experiences through interpretation, analysis, and cognitive representation, which contributes to enhancing understanding and retention.

A. Research Objectives

1. Identify the effect of using skill exercises based on generative learning in learning the handling skill in handball among students.
2. Identify the effect of using skill exercises based on generative learning in learning the skill of shooting in handball among students.
3. Revealing the effectiveness of skill exercises based on generative learning in enhancing students' retention of handling and correction skills.

B. Research Hypotheses

1. There are statistically significant differences between the scores of the experimental group students in the pre- and post-test of the skills of handling and correction with handball in favor of the post-test.
2. There are statistically significant differences between the scores of the experimental group students and the control group students in the post-test of handling skills and correction skills, in favor of the experimental group.
3. There are statistically significant differences in the scores of students of the experimental group and students of the control group in the test of retention of handling and correction skills, in favor of the experimental group.

2. METHODOLOGY

A. Study Design

Experimental research is a scientific method that aims to test hypotheses by conducting an experiment in which at least one independent variable is controlled to observe its effect on a dependent variable, under finely controlled conditions. Therefore, the researchers used the experimental method to adapt it to the research problem (Ali et al., 2024; Ali & Hamid, 2021; H. H. Khalaf et al., n.d.).

B. Participants

The research sample was deliberately selected, and it was represented by students of the second stage in the College of Physical Education and Sports Sciences at Anbar University for the academic year 2024-2025, and the number of its members reached 80 students distributed over two divisions.

This means collecting information and using devices and tools in research.

a) Means of collecting information

The researcher relied on a variety of means to collect theoretical and field information, including the following:

1. Arab and foreign sources: To view the literature and previous studies related to the subject of research.
2. International Information Network (Internet): For up-to-date data and references.
3. Personal interviews: Conducted with experienced and specialized people to obtain supportive scientific opinions.
4. Supporting team: Contribute to the implementation of experiments and data collection.
5. Tests and measurement: Standardized tools were used to measure variables related to the research topic.

b) Devices and tools used in research.

A number of field devices and tools were used that helped in conducting tests and collecting data accurately, namely:

- Two electronic stopwatches.
- Legal handball court
- Handball Goals Medical Balance
- Iron correction boxes dimensions (50× 50 cm number (2).
- Manual electronic calculator (origin: China).
- Handballs (12 balls).
- 50-meter tape measure.
- Colored adhesive tape to mark distances or markings.
- Two sirens to alert and regulate during the experiment.
- Signs used as signs.
- Cones to select tracks or performance areas.

c) Determine the skill and test used.

Through the survey of sources, the researchers determined the skill of the test, codified the context of its work on similar samples, which have documented laboratories and scientific foundations, and were identified and presented by presenting them to a group of experts.

Table 1. Shows the specifications of the tests used

No:	Skill	audition
1	Head-level whip handling	Whip handling from the level of the head in the form of an oval drawn on a flat wall for a period of 30 seconds, and from a distance of 3 m
2	Aiming from the head level of the pivot	Aiming from the pivot and from the level of the head on the squares of the accuracy of aiming (50×50) from a distance of 7 m

Study Tests

a) Handling test from the level of the head in the form of an oval drawn on a wall for (30) seconds and from a distance of (3) m (Dia Al-Khayyat, 1995, p. 53)

Purpose of the test: Measurement of handling skill.

Tools: A flat wall painted with an oval.

1. Handball number (1).
2. Tape measure.
3. Stopwatch.
4. Adhesive tape.

Performance Specification: The player stands behind a line marked on the ground, positioned 3 meters away from the wall. Upon the verbal cue "Start," the player performs overhead ball handling within an oval target drawn on the wall, aiming for the maximum number of repetitions within a 30-second period.

Scoring method: calculates the correct number of times to handle the ball and receive it.

b) Test correction from the pivot and from the level of the head on the squares of the accuracy of the correction (Raysan Khreibit, 1989, p. 311)

Purpose of the test: To measure aiming skill in handball.

Equipment: A handball court, target squares (50x50 cm) hung in the upper corners of the goal, and 10 handballs.

Procedure: The player performs a two- or three-step approach, shoots from behind the 7-meter line, and aims for the accuracy squares in the upper corners of the goal, releasing the ball from head level. Three consecutive shots are taken at each of the accuracy squares.

Scoring: The score is the total number of successful shots where the entire ball lands within the designated accuracy square.

Study Procedures

a) Exploratory experiment.

The experiment was conducted on Monday, 18/11/2024 on the handball court in the hall of the College of Physical Education and Sports Sciences at the University of Anbar, on a sample of (5) students from the second stage in the College of Physical Education and Sports Sciences - Anbar University, and from outside the original sample of the research. Has this experiment contributed to revealing a number of important observations that researchers benefited from in developing research tools and procedures?

b) Pre-tests

Before proceeding with the pre-tests, the researchers organized and equipped the test tools into two groups: control and experimental, with the names of the students in each group recorded. The pre-tests were conducted on the sample members on Tuesday, 19/11/2024.

c) Main experience

After conducting the pre-tests, the generative learning model was applied, which states that it is not only a technical means but a smart partner in development, analysis, and planning. By generating new data or simulating reality, teams and players can reach higher and more professional performance levels. The implementation of skill exercises based on generative learning was started by the specialized teacher within the educational curriculum prepared by the researchers for the experimental group on Wednesday. Corresponding to 20/11/2024, the control group applied the traditional learning followed in the curriculum.

The experimental approach of the experimental group included the following:

1. The skills under study were learned in the lecture within the prescribed educational curriculum, which includes both warm-up, physical exercise, educational activity, and the final section, but the applied activity differs as the experimental group uses the generative learning method only.

2. The experimental group used skill exercises based on generative learning in learning the skill of handling the whip from the level of the head and the skill of shooting handball, where the duration of the educational curriculum two months by (16) educational units distributed over two educational units per week for each group and the time of the educational unit (60) minutes distributed to:

- Preparatory section (10) minutes.
- The main section is (40) minutes, (10) minutes is educational, and (30) minutes is applied.
- Final section (10) minutes.

3. The control group followed the curriculum prepared by the subject teacher.

d) Post-tests

The post-tests were conducted on Monday, 21/1/2025, on the control and experimental research groups in the skill of handling from the level of the head and the skill of correction, in the same conditions in which the pre-tests were conducted.

e) Retention tests.

Eight days after the post-tests, the researchers carried out a retention test for both the control group and the experimental group on Tuesday, January 29, 2025. This test aims to measure the stability of learning and to extract the level of performance that has actually been established in motor memory, away from the influence of temporary factors that may affect the results of the immediate tests. To ensure the accuracy of the measurement and the impartiality of the results, the researchers were keen to prevent members of the two groups from practicing the two skills under study during the period of Waiting, to ensure that no external influences occur that may lead to enhanced or decreased performance unrelated to the research experience.

f) Statistical means

The researchers employed the following statistical methods to analyze the data collected from the research tests and derive the final results (Hammood et al., 2024; Y. A. Khalaf et al., 2025; Omar et al., 2025): arithmetic mean, standard deviation, kurtosis, paired-samples t-test, independent-samples t-test, and Pearson correlation.

3. RESULTS

Presentation and analysis of the results of the pre- and post-skill tests of the experimental group.

Table 2. Shows the results of the arithmetic means and the standard deviation of the pre- and post-tests of handball handling and shooting skills of the experimental group

Variables	Unit of measurement	Pre-test		Post-Test		Standard deviation difference	Difference of arithmetic means	Value(v) Calculated	Significance of differences
		M	SD	M	SD				
Handball handling skill	degree	29,31	1,52	38,34	4,26	9.03	6.22	9.21	Moral
Handball shooting skill	degree	2,68	0,31	4,15	0,67	1.47	1.61	5.88	Moral

Tabular value (T) (1.68) at significance level (0.05) and degree of freedom (39)

Table 2 presents the pre- and post-test results for the experimental group's handball handling and shooting skills, including arithmetic means, standard deviations, and the differences between them. The calculated t-value for the handling skill test was 9.21, and for the handball shooting test, it was 5.88. Both of these values are greater than the critical t-value of 1.68, indicating statistically significant improvements in favor of the post-tests.

Presentation and analysis of the results of the pre- and post-skill tests of the experimental group.

Table 3. Shows the results of the arithmetic means and the standard deviation of the pre- and post-tests of the handling and shooting skills of the handball of the control group

Variables	Unit of measurement	Pre-test		Post-Test		Standard deviation difference	Difference of arithmetic means	Value(v) Calculated	Significance of differences
		M	SD	M	SD				
Handball handling skill	degree	29.10	1.32	34.88	5.02	5.78	6.23	5.89	Moral
Handball shooting skill	degree	2.51	0.31	3.59	0.66	1.08	2.01	3.48	Moral

Tabular value (T) (1.68) at significance level (0.05) and degree of freedom (39)

Table 3 details the outcomes of the pre- and post-tests assessing the handball handling and shooting skills of the experimental group. The table includes the arithmetic means and standard deviations for both testing periods, along with the calculated differences. The t-value determined for the handling skill test was 9.21, while the t-value for the handball shooting test was 5.88. As both of these values are greater than the table value of 1.68, it signifies statistically

significant improvements in these skills from the pre-test to the post-test for the experimental group.

Presentation and analysis of the results of skill and post-test tests for the control and post-groups.

Table 4. Shows the results of the arithmetic means and standard deviation of the post-tests of handball handling and shooting skills for the experimental and control groups

Variables	Unit of measurement	Experimental Group		Control group		Value(v) Calculated	Significance of differences
		M	SD	M	SD		
Handball handling skill	degree	38.34	4.26	34.88	5.02	3.29	Moral
Handball shooting skill	degree	4.15	0.67	3.59	0.66	3.11	Moral

Tabular value (T) (1.99) at significance level (0.05) and degree of freedom (78)

Table 4 presents the post-test results for handling and handball shooting skills for both the experimental and control groups, displaying the arithmetic means and standard deviations. The calculated t-value for the handling skill test was 3.29, and for the handball shooting test, it was 3.11. Both of these values exceed the critical t-value of 1.99, indicating statistically significant differences in favor of the experimental group.

View and analyze the retention results of the two skills.

Table 5. Shows the retention ratio of the two groups in the handling skill and the skill of aiming with handball

Variables	Experimental Group	Control group	The difference between the two ratios
	Retention Percentage	Retention Percentage	
Handling skill	98.5	97.59	91.0
Aiming skill	94.2	93.36	0.84

Table 5 shows the following.

The experimental group achieved a retention rate of handling and correction skills respectively (98.5, 94.2) while the retention rate of the control group in the two skills respectively (97.59, 93.36) and when comparing the two ratios as shown in the table above, we find that the experimental group that used generative learning has achieved a higher retention rate than the control group that used the traditional method used in the curriculum.

4. DISCUSSION

To identify the extent to which the objectives sought by the researchers sought to study, which are to know the impact of the generative learning model on learning the skills of handling and correction in handball, it is clear from the results presented in tables (5,4,3,2) that there are statistically significant differences between the results of the pre- and post-tests for both the experimental and control groups.

These differences in favor of the experimental group were attributed to the use of the generative learning model, which relies on activating a set of thinking processes in the learner in the context of solving educational problems. This model is based on linking the learner's previous experiences with new information and knowledge, and the role of questions asked in educational units in order to reveal what learners possess of concepts related to the new skill. This contributes to the motivation of learners and motivates them to interact and participate actively, which in turn leads to the promotion of Information in memory.

This method also helped to attract the attention of learners and increase their desire to learn, by stimulating their abilities to think and solve problems, as "generative thinking is an ability to produce solutions to a problem to which the individual does not have a ready-made answer" (Sahar Al-Sayed, 2000, p. 75). In addition, collaborative work within small groups has played an active role in promoting understanding and knowledge sharing, he points out (Walid Rafiq, 2011, p. 84). He pointed out that cooperative learning in small groups enables individuals to support each other in order to improve collective performance and achieve common goals.

The experimental group that learned using the generative learning model outperformed its control counterpart, which learned in the traditional way, both in the performance of handling and correction skills and in its ability to retrieve and retain information. The literature asserts that "what an individual remembers depends on the way he learns knowledge, as the method of learning determines what will be retained later" (Faiq, 2002, p. 361). Hence, the use of modern educational methods, such as the generative model, helped to consolidate information and achieve real and effective learning. The experimental group also excelled in the percentage of retention for the control group through the experience gained from learning with the generative model as well as understanding and realizing the basic rules and principles for learning the two skills, as well as that the success of learners in learning the correct performance of the two skills led to their sense of satisfaction and satisfaction as a result of repeated successful attempts that satisfied their needs, which was reflected in the increase in retention. (KNAPP, 1977, p. 103) Emphasizes that the retention of the skill experiences

performed by the learner successfully is better than the unpleasant skill experiences (Abdulrazzaq, Mahmoud, et al., n.d.; Abdulrazzaq, Moseekh, et al., n.d.).

In conclusion, it is found that the experimental group that learned using the generative learning model has made a remarkable development that exceeds that of the control group that relied on the traditional method, which in turn showed improvement, but was relatively limited in learning and retention.

5. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

- 1- The experimental group outperformed the control group in the ratio of learning for handball handling and aiming skills.
- 2- The experimental group was the best in the ratio of handball handling and aiming skills.

Recommendations

- 1- Conduct similar research to other handball skills.
- 2- Work on the use of models and other educational methods that increase the retention rate of the skills studied.

REFERENCES

- Abdulrazzaq, N. K. (n.d.). The effect of using two methods of embedding and learning through practice in teaching the skills of handling and dribbling in handball.
- Abdulrazzaq, N. K., Mahmoud, S. A. L., Ohmayed, R., Mashaan, A. H. R., & Suleiman, H. A. (n.d.). The effect of the Deans Model on mental motivation and learning the skills of receiving transmissions and preparing volleyball.
- Abdulrazzaq, N. K., Moseekh, L. Z., Ali, S., & Danhash, H. A. S. (n.d.). The effect of a proposed educational program using specific exercises to develop motor response, motor satisfaction, and short-term defensive movement skills in handball.
- Al-Ayasrah, W. R. (2011). Teaching, learning and educational psychology. Dar Osama for Publishing and Distribution.
- Ali, O., & Hamid, H. (2021). Building of psychological directions parameter for Anbar Educational Directorate teachers for non-specialty towards practicing classroom and extracurricular activities. *Anbar University Journal of Physical Sciences and Sports*, 12(23), 23–46. <https://doi.org/10.37655/uaspesj.2021.175083>
- Ali, O., Mushref, A., & Ali, B. (2024). The role of supplements in improving muscular strength and endurance in professional soccer players: A systematic review.

- American Journal of Social and Humanitarian Research, 5(12), 485–497.
<https://doi.org/10.31150/ajshr.v5i12.3116>
- Al-Khayyat, D., & Al-Hayali, N. M. (2001). Handball. University of Mosul, Dar Al-Kutub for Printing and Publishing.
- El-Sayed, S. (2000). The effectiveness of micro-teaching using the generative model for teaching science in developing the teaching skills of female students of the Faculty of Physical Education (PhD thesis, Faculty of Physical Education for Girls, Helwan University).
- Faeq, A., & Abdel Qader, M. (2000). Introduction to general psychology. Egyptian Al-Naglo Library.
- Hammood, Y. M., Awad, A. K., Ali, O. A., Mushref, A. J., & Hummadi, J. N. (2024). Measuring the aggressive behavior of the teams in the Iraqi Premier League in football and its relation to the results and ranking of the league for the 2022–2023 season. *Sportske Nauke i Zdravlje*, 14(2), 127–134.
<https://doi.org/10.7251/SSH2402127H>
- Khalaf, H. H., Abraham, A. A., Khaleel, N. M., Hummadi, J. N., Mushref, A. J., & Ali, O. A. (n.d.). The impact of the Dines model as an educational mediator on cognitive achievement and learning overhead passing skill in volleyball.
- Khalaf, Y. A., AbdulJabbar, M. A., & Ali, O. A. (2025). The effect of sports job burnout on the performance of workers in student activities departments in Iraqi universities. *Retos*, 66, 86–95. <https://doi.org/10.47197/retos.v66.113271>
- Khuraibet, R. M. (1989). Measurement and tests in physical education (Part 1). Dar Al-Kutub and Documents.
- Knapp, B. (1977). Skill in sport: The attainment of proficiency. Billing and Sons Limited.
- Mashaan, R. O., & Abdulrazzaq, N. K. (2024). [Article title missing]. *American Journal of Social and Humanitarian Research*, 5(12), 514–521.
- Omar, A. F., Hammadi, W. K., Moseekh, L. Z., Muhammad, K. M., Saleh, M. M., & Ali, O. A. (2025). The impact of cognitive training on field intelligence growth and some composite skills of advanced football players. *Retos*, 66, 46–58.
<https://doi.org/10.47197/retos.v66.113234>
- Yassin, W., & Al-Obaidi, H. M. (1999). Statistical applications and computer use in physical education research. Mosul, Dar Al-Kutub for Printing and Publishing.