

The Effect of Learning Units Based on the Osborn Model on Mental Imagery and Selected Fundamental Handball Skills among Students

Qahtan Khudhair Abbas

Assistant Lecturer, Diwanayah Education Directorate

alkardyqhtan@gmail.com

ARTICLE INFO

Received: 10 Jul
Accepted: 19 Aug
Volume: 3
Issue: 4

ABSTRACT

The study aimed to find out the effect of learning units based on the Osborn model on mental imagery and a set of basic handball skills for the second-grade students in the College of Physical Education and Sport Sciences, University of Al-Qadisiyah. These students exhibited low levels of mental imagery and low-performance levels in several basic handball skills, which can be attributed to the conventional instruction that neglected the cognitive and thinking aspect of learning, so the researcher decided to use the Osborn model to gain the skills. Since the experimental design with two equivalent groups was most appropriate for the problem, it was selected. The subjects were selected from the 200 second year students of the College in the 2025/2026 academic year, excluding those who attended irregularly or were involved in competitive handball, as 20 students were randomly selected from each group (B) and (D). The results show that the mental imagery was improved by the learning units developed by Osborn and the basic skill variables studied were also improved, with the experimental group showing a significant difference in post-test compared to the control group. Based on the above, the researcher suggests adopting the model of Osborn in the process of teaching handball skills, as it has a positive impact on students' skill development and cognitive development.

Keywords: Osborn model; mental imagery; handball skills; brainstorming; motor learning.

1. Introduction

Teaching and learning are the basis that students' ability is created on and academic and skill levels in the different sport disciplines are improved. Over the past few years, educational institutions have substantially increased their application of modern teaching techniques and learning models which focus on the student as the main protagonist of the lesson. The expansion of knowledge and scholarship has forced teachers to adopt a variety of teaching strategies based on the type of sport skills and their learning requirements (Mosston & Ashworth, 2008). Sport is an area where physical, cognitive and psychological aspects have to be integrated to achieve optimal performance. Therefore, it has become necessary to fulfill the educational objectives in an efficient manner by attending to modern models in teaching, which include teaching models that can develop students' sport skills.

Instructional models are modern approaches that help organise the educational process and develop students' performance by following carefully designed scientific steps that cultivate their thinking and their cognitive and motor abilities. Among these models, the Osborn model

stands out; it relies on stimulating thinking and developing the capacity to generate ideas through participatory and interactive teaching techniques. The model derives from the brainstorming procedure devised by Alex F. Osborn, in which a group generates the largest possible number of ideas without criticism before evaluating them (Osborn, 1953), a procedure whose cognitive and motivational mechanisms have been extensively studied (Paulus & Brown, 2007). The model also helps create a stimulating learning environment that assists students in being creative and thinking in an organised manner while learning. It encourages positive interaction with the learning situation, which helps raise achievement and skill performance, and it gives students the opportunity to express their ideas and engage in learning activities effectively. The use of the Osborn model in the field of sport has thus become one of the modern trends aimed at developing students' motor and cognitive performance.

Mental imagery is one of the important cognitive processes in the field of sport, given its major role in improving skill performance and increasing students' concentration and attention. Imagery enhances the quality of the skill, reduces errors, increases self-confidence and facilitates the control of movement components in the sport, as it enables the student to visualize the skill before moving through the actual skill (Duda et al., 1989; Shamoun, 1999). Meta-analyses have shown that mental practice and imagery interventions are effective in producing real change in motor performance, particularly when combined with actual practice (Driskell et al., 1994; Simonsmeier et al., 2021), and imagery is now recognised as a fundamental psychological skill in sport (Cumming & Williams, 2012). The ability to develop mental imagery has thus been adopted as an important part of contemporary sport-skill instruction.

Handball is a team game characterised by speed and excitement, and it requires the possession of a variety of fundamental skills for good performance during play. Among the most important of these are the pivot (standing) shot and the jump shot, which play a central role in scoring goals and gaining superiority in matches; their execution requires motor coordination, accuracy, concentration and rapid decision-making in the varying situations of play. A student's success in performing shooting skills depends on the ability to link cognitive and motor aspects during execution. Teaching these skills therefore requires modern instructional approaches that develop skill performance correctly.

The significance of this research lies in its use of a contemporary instructional model to develop both the cognitive and the motor-skill dimensions of students' learning within the lesson. In addition, the research may provide scientific findings that help teachers adopt modern instructional approaches in teaching handball skills, and it may open the way for researchers to conduct similar studies in other sports and events.

1.1. Research problem

Through his follow-up as a specialist in this field and an observer of handball lessons, the researcher noticed a clear weakness among second-year students in performing some

fundamental handball skills, particularly the pivot shot and the jump shot; this was evident in the frequency of errors, poor accuracy and the inability to execute the skill correctly during the lesson. The researcher also observed that most teachers rely on traditional teaching methods that focus solely on the motor aspect without attention to the cognitive aspects that accompany learning. In the researcher's view, a weakness in students' ability to form a mental image of the skill before executing it adversely affects the level of motor performance and self-confidence during application, and weak mental imagery makes it difficult to grasp the details of the skill and to link the phases of performance correctly. The research problem is therefore framed as a question: what effect do learning units built on the Osborn model have on the development of mental imagery and of selected fundamental handball skills in second-year students at the College of Physical Education and Sport Sciences?

1.2. Research objectives

1. To determine how learning units built on the Osborn model influence mental imagery and selected fundamental handball skills in the students.
2. To establish which of the two approaches—Osborn-based learning units or the teacher's customary method—produces the greater gain in mental imagery and in the selected fundamental handball skills.

1.3. Research hypotheses

1. Both the experimental and the control group will show statistically significant pre-to-post gains in mental imagery and in the selected fundamental handball skills.
2. In the post-test, the experimental group taught with Osborn-based learning units will differ significantly from the control group in mental imagery and in the selected fundamental handball skills, with the advantage lying with the experimental group.

1.4. Research scope

Human scope: second-year students enrolled at the College of Physical Education and Sport Sciences, University of Al-Qadisiyah.

Temporal scope: 27 September 2025 to 21 January 2026.

Spatial scope: the College's indoor sports hall.

2. Research Methodology and Field Procedures

2.1. Research method

An experimental design with two equivalent groups (experimental and control) was employed, this being the approach most consistent with the nature and aims of the study.

2.2. Population and sampling

The participants consisted of the 200 students enrolled at the second grade of the College of Physical Education and Sport Sciences, University of Al-Qadisiyah, during the academic year

of 2025/2026. The sections (B) and (D) were selected at random, and 40 students (20 from each section) were randomly assigned to an experimental and a control group. Students who come to school poorly or students who are competitive in handball were excluded from the sample to maintain the two groups as similar as possible and to meet the goals of the study. Another ten students from the same population, but outside the main sample, were set up to form a pilot group to discover any problems or difficulties which would likely occur in conducting the tests and the major experiment.

2.3. Sample homogeneity

So that individual differences among the participants would not distort the results, the sample was checked for homogeneity in height, weight and age (Table 1).

Table 1. Homogeneity of the sample in height, weight and age (n = 40)

Variable	Unit	Mean	SD	CV (%)	Assessment
Height	Cm	167.200	3.318	2.062	Homogeneous
Weight	kg	63.500	2.260	4.610	Homogeneous
Age	years	19.700	0.823	4.142	Homogeneous

CV: coefficient of variation; values below 30% indicate a homogeneous sample.

2.4. Research instruments and equipment

Arabic and foreign references; tests and measurements; personal interviews; the mental imagery scale form; a test-recording form; a Sony video camera; regulation handballs; skill diagrams; a stopwatch; and a medical scale for measuring body weight.

2.5. Skills under study

The two skills investigated—the pivot shot from shoulder level and the high jump shot—were selected from the curriculum set by the Ministry of Higher Education and Scientific Research, and a specific test was adopted for each.

2.6. Tests used in the research

2.6.1. Pivot shot from shoulder level (Al-Badri & Al-Sudani, 2011, p. 272)

Purpose: to assess shooting accuracy from a pivot stance.

Equipment: eight handballs and four steel target squares (40 × 40 cm) mounted in the corners of the goal.

Procedure: holding the ball, the student takes position behind the 7 m line; on the signal he shoots in turn at squares 1, 2, 3 and 4, and the round is then repeated, giving eight shots altogether.

Conditions: the pivot foot must stay in place throughout the throw, and each shot must be released within three seconds of the signal.

Scoring: a shot landing inside the designated square earns one point and a shot outside it earns nothing; a shot is also recorded as zero if a rule is broken, such as lifting the pivot foot or

exceeding the three-second limit. The sum of the eight shots (0–8 points) gives the student's overall accuracy score (Figures 1 and 2).

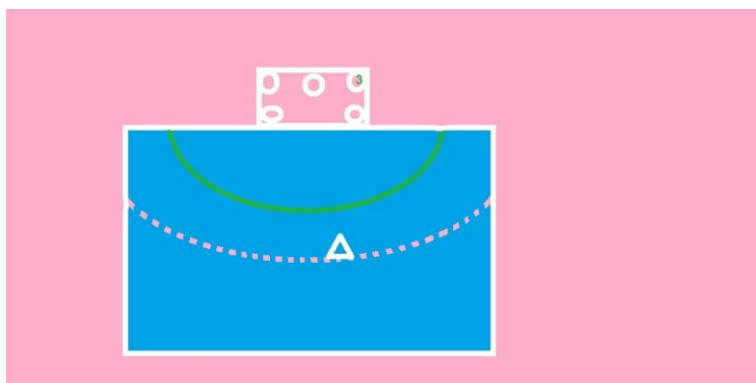


Figure 1. The pivot shot from shoulder level test (as in the original manuscript).

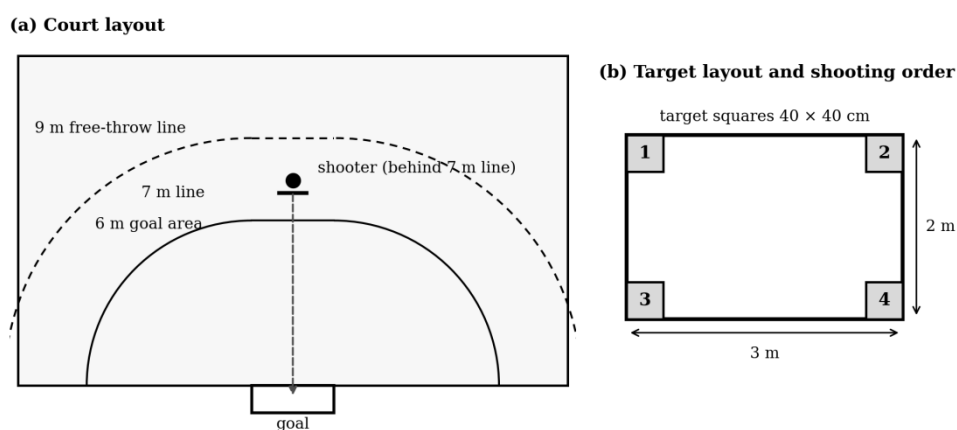


Figure 2. Pivot-shot accuracy test: (a) court layout with the shooter behind the 7 m line; (b) the four 40×40 cm target squares and shooting order.

2.6.2. High jump shot (Al-Khayyat & Qasim, 1988, p. 352)

Purpose: to assess shooting accuracy from a high jump.

Equipment: a handball goal and court, regulation handballs, four steel target squares (60×60 cm) and seven cones.

Procedure: seven cones are set in a line perpendicular to the goal at 1 m intervals, and the student takes position behind the first of them. On the signal he dribbles through the cones to the 9 m area, clears a 40 cm hurdle with a jump and shoots at the four targets hanging in the goal corners in the order upper right, upper left, lower right and lower left; the whole sequence is run twice.

Test administration: a recorder announces each student's name and logs the results.

Scoring: two points are awarded when the ball goes into a square, one point when it strikes the frame of the square and none when it misses altogether. The total across the eight shots (0–16 points) is the student's overall accuracy score (Figures 3 and 4).

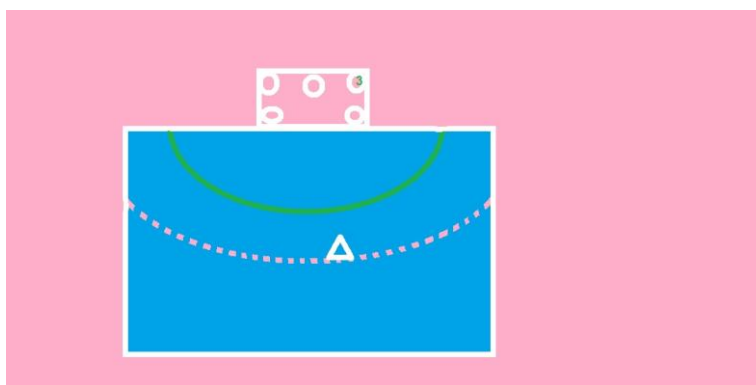
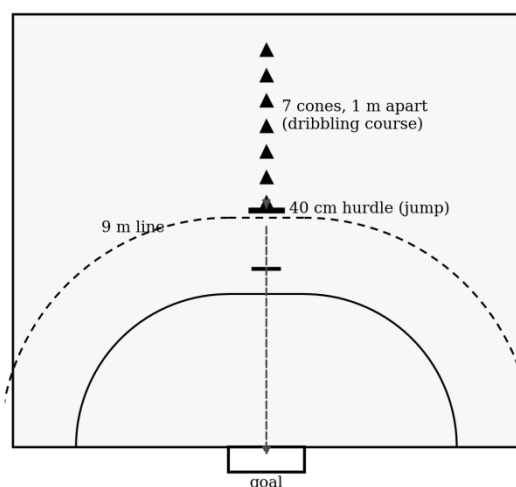


Figure 3. The high jump shot test (as in the original manuscript).

(a) Court layout



(b) Target layout and shooting order

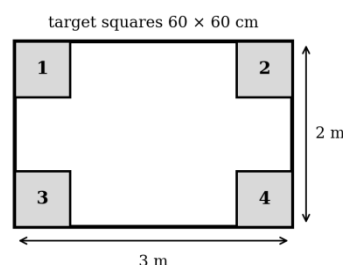


Figure 4. Jump-shot accuracy test: (a) dribbling course of seven cones, 40 cm hurdle at the 9 m line and shooting direction; (b) the four 60 × 60 cm target squares and shooting order.

2.7. Scientific bases of the tests

Validity. Face validity was used: the pivot-shot and jump-shot tests were submitted to a panel of experts in handball and in testing and measurement, who gave their opinions and scientific comments on how well each test measured the target skill. Once these opinions had been analysed, the tests were retained in their final form as suitable instruments for the research variables.

Reliability. The test–retest method was applied. The pilot group sat the tests on Sunday, 28 September 2025, in the College's indoor hall and repeated them a fortnight later, on Sunday, 12 October 2025, in the same venue, under identical conditions and with the same equipment. The correlation between the two sittings served as the reliability coefficient, and its value showed the tests to be highly reliable.

Objectivity. Objectivity was verified by having two judges score each test independently; since the tests rely on specific and fixed scoring criteria, they were found to possess a high degree of objectivity.

2.8. Mental imagery scale

The researcher adopted the Sport Imagery Questionnaire developed by Rainer Martens (1982), which was translated into Arabic and standardised for the Arab environment by Shamoun and Ismail (2001, p. 342). In its final form the scale comprises four sport situations, each containing six statements that measure the various dimensions of mental imagery. The response alternatives for the first five statements represent successive levels of vividness of the mental image, from no image at all, through a poorly clear image, a moderately clear image and a clear image, to an extremely clear image; for the imagery-control statement the alternatives range from no control over the mental image, through limited, moderate and good control, to complete control. These alternatives are scored from 1 to 5 according to the level of response, the higher score indicating better mental imagery. The sixth statement in each situation identifies the type of imagery perspective: a "yes" response indicates internal imagery and a "no" response external imagery. For scoring, the scores of the first statement across the four situations are summed to represent visual imagery, those of the second statement auditory imagery, those of the third kinaesthetic sense, those of the fourth the accompanying emotional state, and those of the fifth the ability to control the mental image, while the responses to the sixth statement determine the imagery perspective (internal or external). The maximum score on the scale is thus 100.

To confirm that the scale suited the present sample, it was submitted to the same panel of handball and measurement experts; once their forms were returned the scale had secured 100% agreement, indicating that it could be applied to the research sample.

2.9. Pilot study

Specialists in research methodology regard the pilot study as indispensable, describing it as "practical training for the researcher to identify the negative and positive aspects encountered during test administration so as to avoid them" (Hassan et al., 1990, p. 107). It was carried out on 13 October 2025 with ten students who were not part of the main sample, its aims being to reveal the chief obstacles the researcher might meet, to fix the number of assistants needed and to ensure that the work would run smoothly. The pilot confirmed that the tests matched the sample's level, exposed the difficulties that might arise in administering them, established how long the experiment would take, and verified the competence of the assisting team, the serviceability of the equipment and instruments, and the sample's readiness to respond to the experiment and tests.

2.10. Pre-tests

"Pre-tests are one of the means of evaluation, measurement, diagnosis and guidance in curricula and programmes at all levels and age stages; they serve as a clear indicator of progress and success in achieving the set objectives" (Allawi & Radwan, 2000, p. 276). The pre-tests for the study variables took place on 14 October 2025 in the College's indoor hall and on its court, with the assisting team on hand to ensure that testing was accurate and orderly. Their purpose

was to record the sample's starting level before the Osborn-based learning units were introduced, so that baseline data would be available for later comparison with the post-tests.

2.11. Pre-test equivalence of the groups

Before the experiment began, an independent-samples t-test was run on the pre-test scores to confirm that the control and experimental groups did not differ significantly in any of the study variables (Table 2).

Table 2. Pre-test comparison of the control and experimental groups (n = 20 per group)

Variable	Unit	Control Mean	Control SD	Exp. Mean	Exp. SD	<i>t</i>	Sig.	Significance
Pivot shot	points	2.202	1.120	2.001	0.866	0.698	0.673	NS
Jump shot	points	4.429	1.980	4.345	0.528	0.462	0.573	NS
Mental imagery	points	47.650	1.430	48.000	1.000	0.942	0.723	NS

NS: not significant at $P > 0.05$.

2.12. The learning programme and its implementation

The researcher's programme ran from 15 October to 20 November 2025 and consisted of 12 learning units, two per week for six weeks. Lesson timing and content followed the curriculum laid down by the College and the Ministry; each unit lasted 90 minutes and was organised into preparatory, main and closing parts. The control group was taught by the teacher's customary method, whereas the experimental group worked through the stages of the Osborn model set out below (Figure 5):

- 1. Posing the problem or situation.** The teacher begins with a question or situation related to the skill (for example: "How can we pass the ball quickly without losing possession?" or "What is the best way to shoot accurately?"). The aim is to stimulate thinking rather than to give the solution directly.
- 2. Idea generation (brainstorming).** Students put forward their ideas freely and without criticism; all ideas are accepted so as to encourage participation. Mental imagery is activated at this stage because the student imagines the performance before executing it.
- 3. Discussion and selection of the best solutions.** The teacher organises the ideas and, together with the students, selects the most suitable ones (which idea is easiest, which is most accurate, which fits the situation).
- 4. Practical application.** The skill is executed on the basis of the selected ideas (passing drills, shooting drills, small-sided game situations). At this stage the student performs with understanding and imagery rather than by rote.
- 5. Evaluation and feedback.** The successful elements and those requiring adjustment are reviewed, and the mental image is revisited.

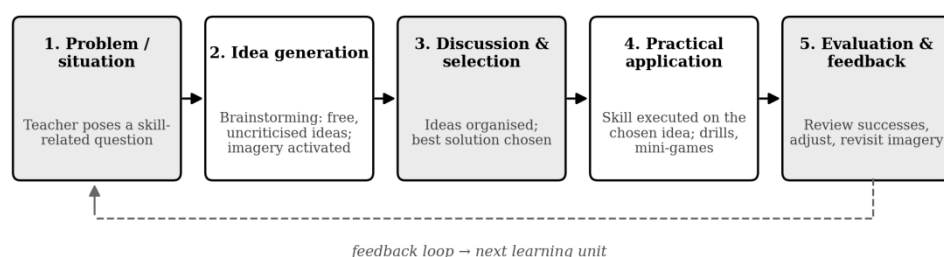


Figure 5. The five stages of the Osborn model as implemented in the learning units of the experimental group.

The time assigned to each part of a learning unit, and the cumulative time for the whole programme, are set out in Table 3.

Table 3. Time distribution within each learning unit and total time of the learning programme (12 units)

Part of the unit	Content	Activity time (min)	Total time (min)	Percentage
Preparatory part (25 min)	Introduction	5	60	5.56%
	General warm-up	10	120	11.11%
	Specific warm-up	10	120	11.11%
Main part (60 min)	Instructional section	20	240	22.22%
	Practical section	40	480	44.44%
Closing part (5 min)	Closing	5	60	5.56%
Total		90	1,080	100%

The total for the practical section was given as 280 min in the original manuscript; $40 \text{ min} \times 12 \text{ units} = 480 \text{ min}$ has been used here.

2.13. Post-tests

Once the programme had ended, the post-tests for the skills under study were given in the College's indoor hall on 23 November 2025, replicating the conditions of the pre-tests.

2.14. Statistical treatment

Data were analysed in SPSS. Descriptive statistics (mean, standard deviation and coefficient of variation) and Pearson's correlation coefficient (for reliability) were computed; within-group pre-post changes were tested with the paired-samples t-test and between-group differences with the independent-samples t-test, taking 0.05 as the significance threshold.

3. Presentation, Analysis and Discussion of the Results

3.1. Control group: pre-test versus post-test

Table 4. Pre-test and post-test scores of the control group (n = 20)

Variable	Unit	Pre-Mean	Pre SD	Post Mean	Post SD	<i>t</i>	Sig.
Pivot shot	points	2.202	1.120	4.960	2.200	9.000	0.001
Jump shot	points	4.429	1.980	7.870	0.608	3.812	0.002
Mental imagery	points	47.650	1.430	52.100	2.025	10.242	0.000

All pre–post differences significant at $P < 0.05$, favouring the post-test.

Table 4 sets out the control group's pre- and post-test scores for the pivot shot, jump shot and mental imagery. In every variable the second measurement exceeded the first, indicating that the group's performance improved over the period of the study.

3.2. Experimental group: pre-test versus post-test

Table 5. Pre-test and post-test scores of the experimental group (n = 20)

Variable	Unit	Pre-Mean	Pre SD	Post Mean	Post SD	<i>t</i>	Sig.
Pivot shot	points	2.001	0.866	6.445	0.526	7.235	0.000
Jump shot	points	4.345	0.528	12.420	0.832	13.000	0.000
Mental imagery	points	48.000	1.000	76.444	1.015	12.963	0.000

All pre–post differences significant at $P < 0.05$, favouring the post-test.

Table 5 presents the corresponding scores for the experimental group. Here too the post-test values were higher in every variable, showing that the group's performance had improved.

3.3. Discussion of the within-group results

The significant pre-to-post gains recorded for the control group in Table 4 point to the effectiveness of the programme delivered by the subject teacher. The researcher ascribes this to the soundness of that programme and to the exercises it contained, which were selected on a scientific basis and performed with correct, regular repetition pitched at the ability and level of the sample. This is confirmed by Khayoun (2010, p. 54), who states that "learning is the repetition of performance in order to improve the individual's movement patterns (motor behaviour) so as to attain the required performance", and it is consistent with the established principle in motor learning that the amount and quality of practice are the most powerful determinants of skill acquisition (Schmidt & Lee, 2011).

Turning to Table 5, the researcher credits the experimental group's gains in mental imagery, pivot shot and jump shot to the learning units designed on the Osborn model. The model increased students' participation in the learning situation and developed their capacity for thinking and motor imagination while learning the skills; the varied learning activities and the

continuous interaction between teacher and students helped improve understanding of the phases of the technical performance of the skills studied; and the model provided multiple alternatives during its stages, which helped correct errors and consolidate correct performance. In the researcher's view, a teaching approach that stimulates thinking, demands active participation and asks students to generate as many alternatives as possible fed directly into the experimental group's higher levels of mental imagery and skill execution. This agrees with Zayer et al. (2014, p. 405), who affirm that the Osborn model is the optimal route to the best and most effective solutions, namely by first generating the largest possible number of potential alternatives and then evaluating them one by one in the following stage—the "generate first, evaluate later" principle that lies at the heart of brainstorming (Osborn, 1953).

3.4. Between-group comparison of post-test scores

Table 6. Post-test comparison of the control and experimental groups (n = 20 per group)

Variable	Unit	Control Mean	Control SD	Exp. Mean	Exp. SD	<i>t</i>	Sig.
Pivot shot	points	4.960	2.200	6.445	0.526	8.050	0.000
Jump shot	points	7.870	0.608	12.420	0.832	15.892	0.000
Mental imagery	points	52.100	2.025	76.444	1.015	24.557	0.000

All differences significant at $P < 0.05$, favouring the experimental group.

Table 6 compares the two groups' post-test scores for the pivot shot, jump shot and mental imagery: the experimental group was ahead in every variable. Figure 6 plots the pre- and post-test means side by side. The groups began at equivalent levels and both progressed, but the experimental group's gain was clearly the larger in all three measures—most strikingly in mental imagery, where its mean climbed by roughly 28 points against roughly 4.5 points for the control group.

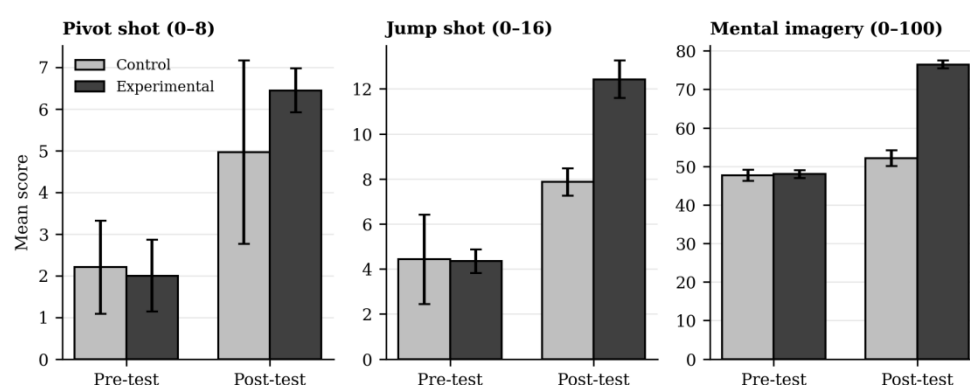


Figure 6. Mean ($\pm$ SD) pre- and post-test scores of the two groups for the pivot shot, jump shot and mental imagery.

3.5. Discussion of the between-group results

Table 6 shows that there are significant differences between the two groups after the test, where group 1 (the experimental group) outperforms group 2 (the control group). The researcher

attributes that development to the learning units developed based on the model of Osborn that involves various exercises and learning situations that are assigned grades and diversified in accordance with students' capabilities and levels. This diversity led to greater interaction with the lesson content and increased motivation to learn, as well as a large number of learning situations, which allowed for more practice and practical application of the skills under various conditions, with the effect of improving the performance of skills and mental images. The researcher found that the different types of exercises in the learning unit decreased the students' boredom and monotonous in the learning process and make the students more concentrated and paid attention in learning, and the repetition of students' performances in students' various learning situations made the students 'learning and acquiring the skill better. This is consistent with Saber et al. (2005, p. 73) who state that if each motor task is performed in the greatest variety of exercises and learning situations in the learning unit, the learner will be more receptive to learning and boredom will not occur in the performance of the motor task, so that learning outcomes will be better obtained and skill performance will be more optimal.

The researcher believes that the improved performance of the experimental group on the mental imagery, pivot shot, and jump shot is due to the more effective learning units developed by Osborn versus the teacher's traditional teaching approach. The model offered an active learning environment that allowed students more opportunities to interact and participate in the implementation of the lesson content, helping them grasp the skills better; it also helped to develop thinking, organizing ideas and linking them to motor performance when learning the skills studied, and the diversified activities and continual feedback stimulated the students' motivation and enhanced their performance. The researcher thinks that this active involvement of the learner in the learning process from the beginning to the end of their lesson is what increased mental imagery and skill accuracy compared to the conventional learning group in which the researcher did not have the learner as the main object of the lesson. Adoption of the Osborn model also increased concentration and attention and mobilised students' cognitive abilities in line with the requirements of learning handball skills. This corresponds with Nizar (2015, p. 112) who states that the modern models of instruction centered on the student, make the student more capable to participate in and to think about the lesson and consequently the achievement of the educational goals is affected positively. It also conforms with the description of student-centred teaching styles by Mosston and Ashworth (2008).

The experimental group's lead in mental imagery specifically is attributed by the researcher to the Osborn-based units and the structured learning stages they contained, which gave students more scope to think, imagine and retrieve images of the movement before performing it. The model activated the cognitive processes associated with learning by involving students in discussing learning situations, analysing performance and finding suitable solutions to the problems they encountered. Progression in presenting the skills and repeated practice accompanied by guidance and feedback contributed to the formation of clearer and more precise mental images, which was reflected positively in the students' level of mental imagery.

In the researcher's view, improved mental imagery helped students perceive the details of the skill and grasp its technical phases more effectively, which in turn was reflected in their performance in the pivot shot and jump shot. The learning environment provided by the model also encouraged concentration, attention and continuous mental rehearsal of the skills studied, which enhanced self-confidence and reduced hesitation during performance. This agrees with Al-Khaykani et al. (2015, p. 96), who affirm that after practising contemplation, imagery and imagination the learner develops positive feelings that contribute to physical and mental growth, that imagery is an effective means of communicating with the inner self and relieving daily pressures, and that its regular practice leads to positive and distinguished results in learning; it also accords with the meta-analytic finding that pairing imagery with physical practice outperforms physical practice on its own (Simonsmeier et al., 2021).

4. Conclusions and Recommendations

4.1. Conclusions

1. Learning units built on the Osborn model raised the mental imagery of the second-year students who took part in the study.
2. The same units brought about a significant improvement in the experimental group's pivot-shot and jump-shot performance.
3. In every research variable (mental imagery, pivot shot and jump shot), the experimental group finished ahead of the control group.
4. The stages of the Osborn model and the varied learning activities accompanying it increased students' interaction and raised their level of participation in the learning process.
5. The learning units based on the Osborn model improved the linkage between cognitive aspects and skill performance among students while learning handball skills.

4.2. Recommendations

1. Adopting the Osborn model when teaching handball in colleges of physical education and sport sciences.
2. Giving attention to the development of mental imagery as one of the important factors in learning and developing sport skills.
3. Employing contemporary instructional models that put the learner at the heart of the lesson and increase his active involvement in it.
4. Diversifying the exercises and learning situations within the learning units in keeping with the nature of the skills to be learned.
5. Extending the use of the Osborn model to other sports and skills and to learners at different educational stages.

References

- Al-Badri, J. Q. M., & Al-Sudani, A. K. R. (2011). *The world handball encyclopedia* (1st ed.). Beirut: Dar Al-Safa Publications. [in Arabic]
- Al-Khaykani, A. S., et al. (2015). *Sport psychology* (1st ed.). Najaf: Dar Al-Dhiya for Printing and Design. [in Arabic]
- Al-Khayyat, D., & Qasim, A. K. (1988). *Handball*. Mosul: Dar Al-Fikr for Printing and Publishing, University of Mosul. [in Arabic]
- Allawi, M. H., & Radwan, M. N. (2000). *Measurement in physical education and sport psychology*. Cairo: Dar Al-Fikr Al-Arabi. [in Arabic]
- Cumming, J., & Williams, S. E. (2012). The role of imagery in performance. In S. M. Murphy (Ed.), *The Oxford handbook of sport and performance psychology* (pp. 213–232). New York: Oxford University Press.
- Driskell, J. E., Copper, C., & Moran, A. (1994). Does mental practice enhance performance? *Journal of Applied Psychology*, 79(4), 481–492. <https://doi.org/10.1037/0021-9010.79.4.481>
- Hassan, Q. H., et al. (1990). *Tests, measurement and evaluation in physical education*. Mosul: Higher Education Press. [in Arabic]
- Khayoun, Y. (2010). *Motor learning between principle and application* (2nd ed.). Baghdad: Dar Al-Kutub wa Al-Wathaiq. [in Arabic]
- Martens, R. (1982). *Imagery in sport*. Paper presented at the Medical and Scientific Aspects of Elitism in Sport Conference, Brisbane, Australia.
- Mosston, M., & Ashworth, S. (2008). *Teaching physical education* (1st online ed.). Spectrum Institute for Teaching and Learning.
- Nizar, H. K. (2015). *The effect of the Davis model on visual thinking among fourth-grade students*. Baghdad: Al-Mustansiriya University, College of Basic Education. [in Arabic]
- Osborn, A. F. (1953). *Applied imagination: Principles and procedures of creative problem-solving*. New York: Charles Scribner's Sons.
- Paulus, P. B., & Brown, V. R. (2007). Toward more creative and innovative group idea generation: A cognitive-social-motivational perspective of brainstorming. *Social and Personality Psychology Compass*, 1(1), 248–265. <https://doi.org/10.1111/j.1751-9004.2007.00006.x>
- Saber, Q. L., et al. (2005). *Foundations of learning and teaching and their applications in football*. [in Arabic]
- Schmidt, R. A., & Lee, T. D. (2011). *Motor control and learning: A behavioral emphasis* (5th ed.). Champaign, IL: Human Kinetics.

- Shamoun, M. A. (1999). *Sport psychology*. Cairo: Markaz Al-Kitab for Publishing. [in Arabic]
- Shamoun, M. A., & Ismail, M. M. (2001). *The athlete and mental training* (1st ed.). Cairo: Markaz Al-Kitab for Publishing. [in Arabic]
- Simonsmeier, B. A., Andronie, M., Buecker, S., & Frank, C. (2021). The effects of imagery interventions in sports: A meta-analysis. *International Review of Sport and Exercise Psychology*, 14(1), 186–207. <https://doi.org/10.1080/1750984X.2020.1780627>
- Zayer, S. A., et al. (2014). *The contemporary encyclopedia*. Baghdad: Noor Al-Hussein Office. [in Arabic]