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The effect of an educational programme based on brain control patterns on the acquisition of volleyball skills: passing from above and passing from below (reception).

Dr. Hassina KOULOUGLI[1]
[1]University of Mohamed Bouguerra, Boumerdes, Algeria, Email: h.koulougli@univ-boumerdes.dz /hassinakoulougli@yahoo.fr
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Abstract:
This study aims to determine the extent to which the proposed educational programme based on brain control patterns affects the acquisition of two volleyball skills — passing from above and passing from below (reception) — among second-year undergraduate students (L3).
The study sample consisted of 27 male students enrolled in the second year of the Bachelor's degree in Elite Sports Training in the field of Science and Techniques of Physical and Sports Activities at Boumerdès University. The educational programme was implemented alongside a set of tests and measurements, including: Anthropometric measurements and a brain control assessment.
The brain control assessment relied on the Torrance scale (1988). In addition, skill-specific volleyball tests were administered: The test of passing from above and the test of passing from below (reception).
After statistical processing, the results showed that there were statistically significant differences in learning both passing from above and passing from below between the pre-test and post-test for participants with the right pattern and those with the left pattern, at significance levels of $P \leq 0.01$ and $P \leq 0.001$, respectively. This improvement is attributed to the effective and positive impact of the proposed educational programme on the study participants.
However, the results also indicated that there were no statistically significant differences in post-test scores between participants with the right pattern and those with the left pattern. This confirms that the effect of the educational programme does not differ according to the brain control pattern. This may be because, despite differences in physiological characteristics and information-processing functions, the two brain patterns are complementary and remain interconnected.
Keywords: Educational Program, Brain Control, Learning, Passing Skills, Volleyball

Introduction

The fields of education and sports training have achieved substantial successes and witnessed the accumulation of experience. These achievements are not the result of coincidence, but rather the outcome of sound scientific planning, the application of various scientific disciplines and forms of knowledge, and the findings of researchers and specialists in physical education.
Indeed, in many countries around the world, physical education is now considered an important measure of a nation's progress and development. Similarly, the educational progress of the current era has enabled significant qualitative improvements in major sporting achievements in many team and individual sports. One such sport is volleyball, a team sport characterised by its performance requirements of strength, speed and agility. Therefore, achieving a high level of

performance in volleyball does not happen by chance; it depends on a scientific approach to training players' abilities and potential in order to achieve the desired outcome. Volleyball is also one of the most popular and beloved sports among all segments of society, as its practitioners promote competition and recreation between teams alike. (Anissa Ahmed & Mahmoud Awda, 2016, p. 2).

Learning is one of the earliest experiences that humans have had since the beginning of time. It later became a means of acquiring knowledge, shaping attitudes and acquiring skills, as well as developing the ability to change oneself and one's society. (Widad Jad Allah & Hanaa Al-Rekad, 2015, p. 1698).

Moreover, the natural function and capacity of the brain play a role in learning that is neither limited nor exclusive. Regardless of age, gender, nationality or cultural background, no healthy human brain is deprived of innate capacities; it is naturally endowed with a set of latent abilities. These include the ability to recognise patterns, correct oneself, learn from experience and reduce reliance on external information, and engage in self-reflection. They also include an inexhaustible capacity for creativity and innovation (Nadaa Izzou Ismail, 2013, p. 2). (Nadaa Izzou Ismail, 2013, p. 2).

2. Problem Statement:

In light of scientific and technological progress in the field of physical education, attention has increased towards vital topics related to brain-based motor control. The ways in which brain control can be applied in sports is one of the most important modern subjects in motor control and sports training physiology. This is because it helps save time and effort when selecting appropriate educational curricula, various motor skills for different games and diverse training plans for teaching physical education to students. (Ali Al-Qudoumi et al., 2018, p. 94).

Scientific and psychological studies have also shown that the brain is the foundation and main axis of the mind; thus, it is the basis of human behaviour. It influences and is influenced by human knowledge as it is the basis of cognitive mental activity. The brain is divided into two hemispheres — the left and right — covered by the cerebral cortex. Although these two hemispheres are fully integrated, they have different functional specialisms: the left hemisphere is responsible for certain types of activity, while the right hemisphere is responsible for others. However, they complement each other in many activities.

'Brain control' refers to the situation in which the neural centres in one hemisphere are more active and exert a greater influence on an individual's behaviour than the neural centres in the other hemisphere. In most cases, the left hemisphere dominates. This is evident in the fact that most people use the right side of their body for writing, eating and other tasks. Conversely, the right hemisphere tends to dominate in individuals who perform better with their left side than their right. Occasionally, control may be shared between the two hemispheres, indicating an integrated pattern. (Bayan Ali Abd Ali Al-Khakani et al., 2014, p. 320).

Therefore, brain control is considered an important topic closely related to thinking and learning methods. It is used to learn motor skills and translate them practically, and it has been studied in universities and schools. However, it has not been examined sufficiently in the sports field overall, and in volleyball specifically. (Abd Al-Nasir Abd Al-Rahim, 2010, p. 260)

Moreover, brain control is linked to thinking and learning. Due to its importance in studying students' tendency to rely on one part of the brain rather than the other when processing and

utilising various cognitive information and experiences, brain control plays a role in enhancing the learning and performance of fundamental volleyball skills. Volleyball is a team game that requires players to prepare in physical, skill-based, tactical and psychological ways. Players must also employ their maximum motor, tactical and offensive skills correctly on the playing field. All of this relates to how the brain functions in a fully integrated manner rather than being limited to one aspect alone. This connection makes brain control an essential topic. (Rim Mostafa Mohammad Azzaril, 2012, p. 3).

As learning is one of the pillars of physical and sports education, it forms the basis for acquiring any sports skill. Through learning, teaching methods and the use of multiple, varied approaches to convey skills to players and students, learning becomes an important means of achieving mastery of those skills. Furthermore, in order to develop and enhance learners' skills, it is necessary to use diverse, distinctive and advanced methods and tools to raise their level and achieve the required performance. This is because the learning process is a fundamental factor in understanding learners' abilities, enabling teachers and coaches to identify talented individuals and develop their creativity, excellence, distinction and superiority. (Rim Mohammad Al-Masri, 2015, p. 4).

Based on the above, we propose an educational programme that uses brain control patterns to teach volleyball skills. The programme aims to determine whether there are differences in the way students learn and improve their performance in the two passing skills — passing from above and passing from below (reception) — according to the type of pattern (left, right or integrated). The general research question of the study is therefore as follows:

Does the proposed educational programme based on brain control patterns affect the learning of the two skills — passing from above and passing from below (reception) — among second-year undergraduate students?

The following sub-questions arise from this:

Are there statistically significant differences in the acquisition of overhand and underhand passing skills (receiving) between the pre-test and post-test among students with the right pattern?

Are there statistically significant differences in learning the skills of overhand and underhand passing (receiving) between the pre-test and post-test among students with the left pattern?

Are there statistically significant differences in the post-test results for overhand and underhand passing between students with the right and left patterns, and did these differences favour the post-test?

3. The general hypothesis:

The proposed educational programme has an effect on learning overhand and underhand passing (receiving) skills among second-year Bachelor's (Licentiate) students, according to brain-control patterns.

3.1 Sub-hypotheses:

There are statistically significant differences in learning the skills of overhand passing and underhand passing (receiving) between the pre-test and post-test among students with the right pattern.

There are statistically significant differences in learning the skills of overhand passing and underhand passing (receiving) between the pre-test and post-test among students with the left pattern.

There are statistically significant differences in post-test results for overhand and underhand passing between students with the right and left patterns, with the right pattern performing better.

4. Explanation of Terms

4.1 Educational Programme

It is a structured plan that includes a set of specific exercises aimed at improving performance levels in volleyball passing skills. It encompasses objectives, experiences, activities, teaching methods and evaluation procedures, and is presented as a sequence of steps for successive implementation, designed in a scientific and organised manner. The purpose of the programme is to teach and improve the underhand and overhand passing skills of second-year Bachelor's (Licentiate) students.

4.2 Brain control (brain laterality) pattern

It refers to an individual's tendency towards one of the cerebral hemispheres, which directs their behaviour. It also reflects the distinctiveness of one hemisphere's control over an individual's activities, or their reliance on one hemisphere more than the other in performing those activities. (Ali Al-Qudoumi et al., 2018, p. 1897).

Operationally, it is represented by the score obtained by second-year Bachelor's (Licentiate) students according to the Torrance Scale of Brain Control.

4.3 Learning: Learning is both a concept and a psychological and educational process that occurs through an individual's interaction with environmental experiences. As a result of this interaction, the individual's knowledge, inclinations, values and behavioural or skill abilities increase. This increase may be positive, as expected, or negative when the content or experiences involved in learning are negative or deviant. Thus, learning comprises everything a person acquires through practice and experience, such as attitudes, inclinations, perceptions, and social, motor and mental skills. (Ayoub Dakhil Allah, 2015).

4.4 Skill:

Skill is an ability acquired through observation or experimentation in mental or physical performance. It refers to the speed and accuracy with which a given task is carried out, as well as the ability to adapt to changing situations. (Ahmed Faris Mohammad Saleh, 2011, p. 7).

4.5 Volleyball

Volleyball is a simple team sport played between two teams of six players. It is one of the most popular sports, with two teams separated by a high net. Each team attempts to hit the ball over the net into the opponents' area, with each team being allowed three attempts to strike the ball. A point is scored when the ball lands in the opponents' court, when the opponents commit an error or fail to return the ball correctly. (Al-Atrach Zoubir, 2008).

5. Methodological Procedures:

5.1 Research method used

Given that the research method in scientific enquiry is a set of rules and principles established to reach the truth, and considering the nature and objectives of our study, we adopted an experimental method with a one-group design.

5.2 Sample of the study

The sample consisted of 27 male students in their second year of Bachelor's (Licentiate) studies specialising in elite sports training in the Sciences and Techniques of Physical and Sports Activities at the University of Boumerdès. The mean age was 22.38 ± 1.63 years, the mean weight was 68.92 ± 8.33 kg, and the mean height was 1.79 ± 0.06 m.

This sample was selected using a purposive sampling approach and organised using an experimental design with a one-group method.

The sample was divided into two groups based on preferred laterality (right or left). This was done by applying the brain control scale to each student. We also confirmed the homogeneity of sample members in terms of age, height and weight for both cohorts by calculating the "t" value to test for differences, as shown in the table below:

Group One consisted of 14 students with the right pattern, with a mean age of 22.23 ± 1.74 years, a mean height of 1.78 ± 0.07 m, and a mean weight of 67.68 ± 9.11 kg.

Group Two consisted of 13 students with the left pattern, with a mean age of 22.54 ± 1.56 years, a mean height of 1.79 ± 0.06 m, and a mean weight of 70.16 ± 7.63 kg.

Table 1 shows the selection of sample members based on specified factors to ensure homogeneity when dividing the sample into two groups: students with the right pattern and students with the left pattern.

Variables	Right pattern group	Left pattern group	"T"	Significance level: P ≤ 0.05
Age variable (years).	22.23 ± 1.74	22.54 ± 1.56	0.63	0.05
Height (m)	1.78 ± 0.07	1.79 ± 0.06	0.45	0.05
Weight (kg)	67.68 ± 9.11	70.16 ± 7.63	0.64	0.05

5.3 Study protocol

We administered a set of tests to the study sample, as follows:

5.3.1 Anthropometric measurements

We obtained the date of birth from the members of the study sample. We then measured height and weight using a tape measure and a medical scale (OMRON).

5.3.2 Brain Control Scale (Torrance, 1988)

This test measures the extent to which learners prefer certain learning and thinking methods. It contains 28 groups of two statements each.

Statement "A" corresponds to the right pattern, while statement "B" corresponds to the left pattern. Statements A and B together represent the integrated pattern. Respondents mark (X) next to the statement that applies to them. If both statements A and B apply to the respondent, they may place (X) next to each of them. (Alaa Ziyad Muhammad Mahmoud, 2015).

Scoring key for the Brain Control Scale (Torrance, 1988), as reported by Alaa Ziyad Muhammad Mahmoud (2015).

- Statements "A" (right pattern) are scored 1 ("one").

Statements "B" (left pattern) are scored 0 ("zero").

- Statements "A and B" together (integrated pattern) are scored 0 ("zero").

5.3.3 Skill Tests

In the current study, two skill tests were conducted as follows:

First: Overhand Passing Skill Test Against the Wall

Purpose of the test: To measure the tester's speed and mastery of overhand passing using their fingers.

Equipment: A touch wall with a line parallel to the ground at a height of 3 metres from the floor, a parallel line on the wall located 180 cm away, a volleyball and a stopwatch.

Performance specifications: The tester stands behind the passing line, 180 cm from the wall, holding the ball with both hands in front of their face. They then perform an overhand pass towards the wall and above the drawn line, so that the ball rebounds and reaches them again behind the passing line. They continue the overhand passing with their fingers. The tester continues this performance for half a minute (30 seconds).

Recording: The number of times the ball contacts the wall during the allotted 30 seconds is counted. Any attempt that violates the aforementioned conditions is not counted. The tester's final score is equal to the number of correct attempts within 30 seconds. (Ayman Abda Mohamed et al., 2010, p. 3).

Second: Underhand Passing Skill Test Using Both Arms Against the Wall

Purpose of the test: To measure the tester's ability to perform an underhand pass and their mastery of this technique.

Equipment: A touch wall, a line drawn on the ground parallel to the wall located 80 cm away (the passing line), a volleyball and a stopwatch.

Performance specifications: The tester stands behind the passing line, 180 cm from the wall, holding the ball with both hands. They throw the ball against the wall and receive it by underhand passing, using both hands, so that it rebounds to them behind the passing line. The tester continues this passing performance for 30 seconds.

Recording: The number of times the ball contacts the wall during the 30 seconds allotted for the test is counted. Any attempt that violates the aforementioned conditions is not counted. The tester's final score is equal to the number of correct attempts within 30 seconds. (Ayman Abda Mohammed et al., 2010, p. 3).

5.3.4 The proposed educational programme

The programme was designed to teach overhand and underhand passing skills in volleyball. The aim was to establish whether differences in the effectiveness of the programme occur according to brain control (laterality) patterns in the learning and improvement of these two skills among second-year Bachelor's (Licentiate) students.

The programme includes a series of workshops containing exercises for learning:

- Overhand passing, and
- The underhand passing skill.

The objective of the exercises is to explain and facilitate learning, and they are an effective means to achieve the programme's aims and the educational process.

The proposed educational programme lasted 4 weeks. During this period, seven instructional sessions were conducted, with two sessions per week. Each instructional unit lasted 90 minutes (equivalent to 1.5 hours), resulting in 3 hours per week. Each instructional unit is divided into three learning stages:

First stage: Preparatory stage

This stage includes a general warm-up, a specific warm-up and stretching exercises for 15 minutes.

Second stage: instructional (main) stage

This stage includes a set of exercises for learning the two skills: underhand and overhand passing. These exercises are carried out in the form of workshops and different learning situations for 65 minutes.

Third stage: Concluding stage

This is a cool-down phase involving a set of muscle-stretching exercises, lasting 10 minutes.

6. Means of statistical processing

To process the study data, we used the statistical software Microsoft Office Excel 2010 to calculate the following statistics:

- The arithmetic mean,
- The standard deviation,
- The t-test (T) to examine differences;

We also determined the level of significance at $P \leq 0.05$.

7. Presentation and analysis of results

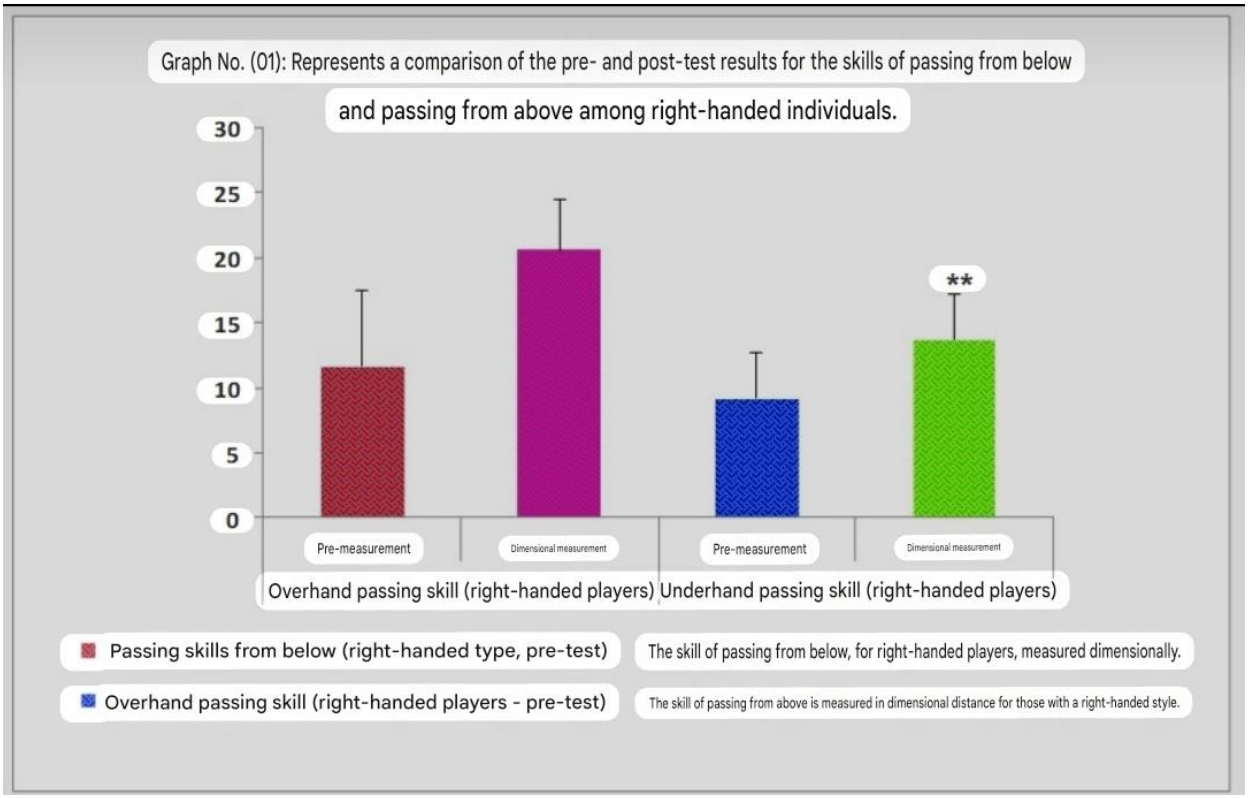
7.1 Comparing the pre-test and post-test results

A comparison was made between the pre-test and post-test results for learning overhand and underhand passing skills among students with the right laterality pattern.

Table No. 2 shows the comparison between the pre-test and post-test results and the skill test results among students with the right laterality pattern.

Tests	Pre-measurement	Post-measurement	"T" value	Significance level: $P \leq 0.05$
Passing skill from the bottom (number)	± 11.625.92	± 20.623.93	0.0001 (***)	0.001
Passing skill from the top (number).	9.153.60±	13.69 ± 3.47	0.003 (**)	0.01
(***) indicates statistically significant differences at $P \leq 0.001$ and (**) at $P \leq 0.01$, where the differences were in favour of the post-measurement for the right pattern group.				

As can be seen from the table above, there are statistically significant differences in learning the overhand passing skill between the pre-test and post-test among right-laterality students, with values of T = 0.0001 and T = 0.003 at significance levels of $p \leq 0.01$ and $p \leq 0.001$, respectively. These differences favoured the post-test.

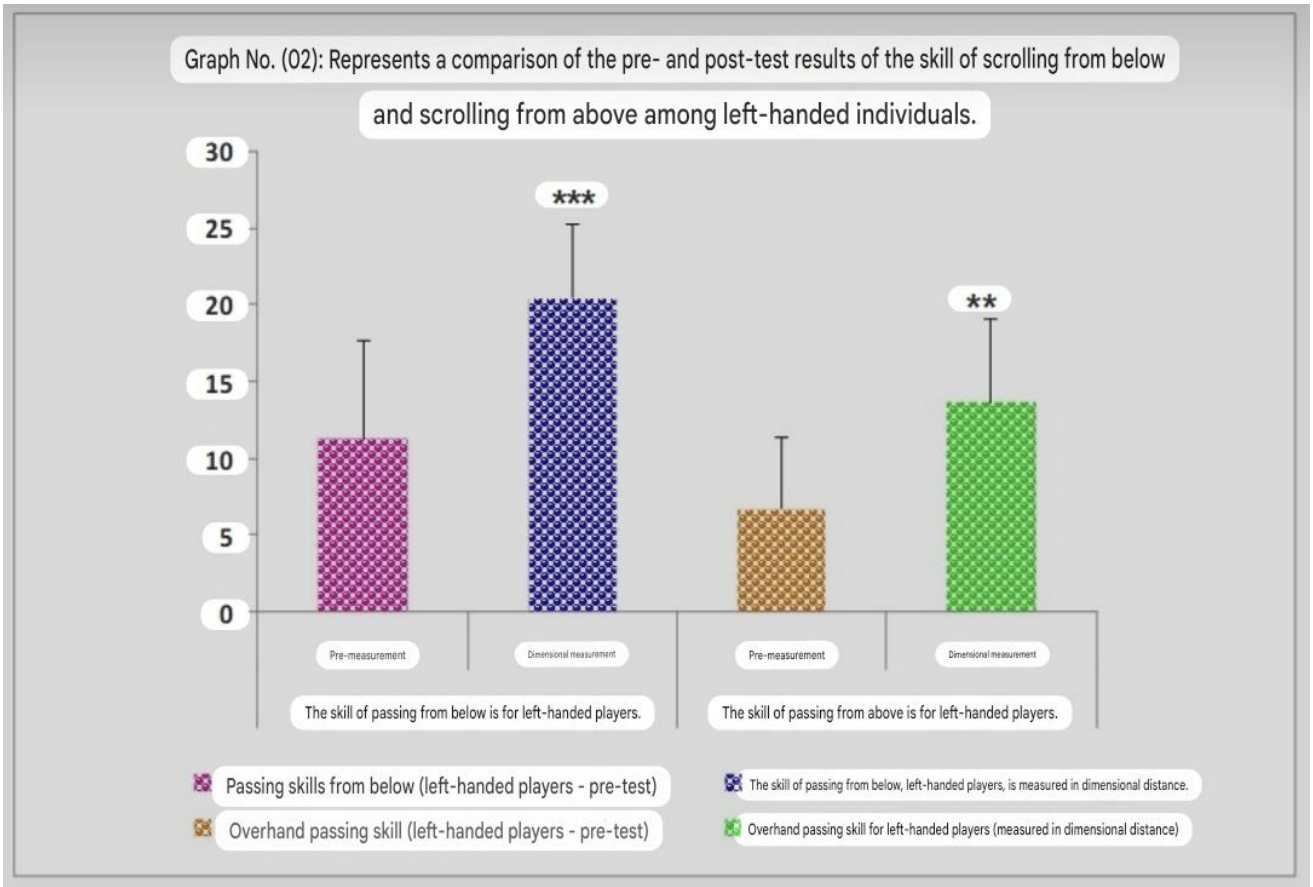


7.2 Comparing the pre-test and post-test results in learning underhand and overhand passing skills among students with the left laterality pattern

Table No. 3: This table shows the comparison between the pre-test and post-test results, as well as the results of the skill tests, among students with the left laterality pattern.

Tests	Pre-measurement	Post-measurement	"T" value	Significance level: $P \leq 0.05$
Passing skill from the bottom (number)	6.41 ± 11.23	± 20.464.75	0.0003 (***)	0.001
(2) Passing skill from the top (number).	6.693.60±	13.62± 5.47	0.002 (**)	0.01
(***) indicates statistically significant differences at $P \leq 0.001$ and (**) at $P \leq 0.01$, where the differences were in favour of the post-measurement for the left pattern group.				

As can be seen from the results in the above table, there are statistically significant differences in learning underhand and overhand passing skills between the pre-test and post-test among students with a left laterality pattern, with values of T = 0.0003 and T = 0.002 at significance levels of $P \leq 0.001$ and $P \leq 0.01$, respectively. These differences favoured the post-test.



7.3 Comparing the post-test results

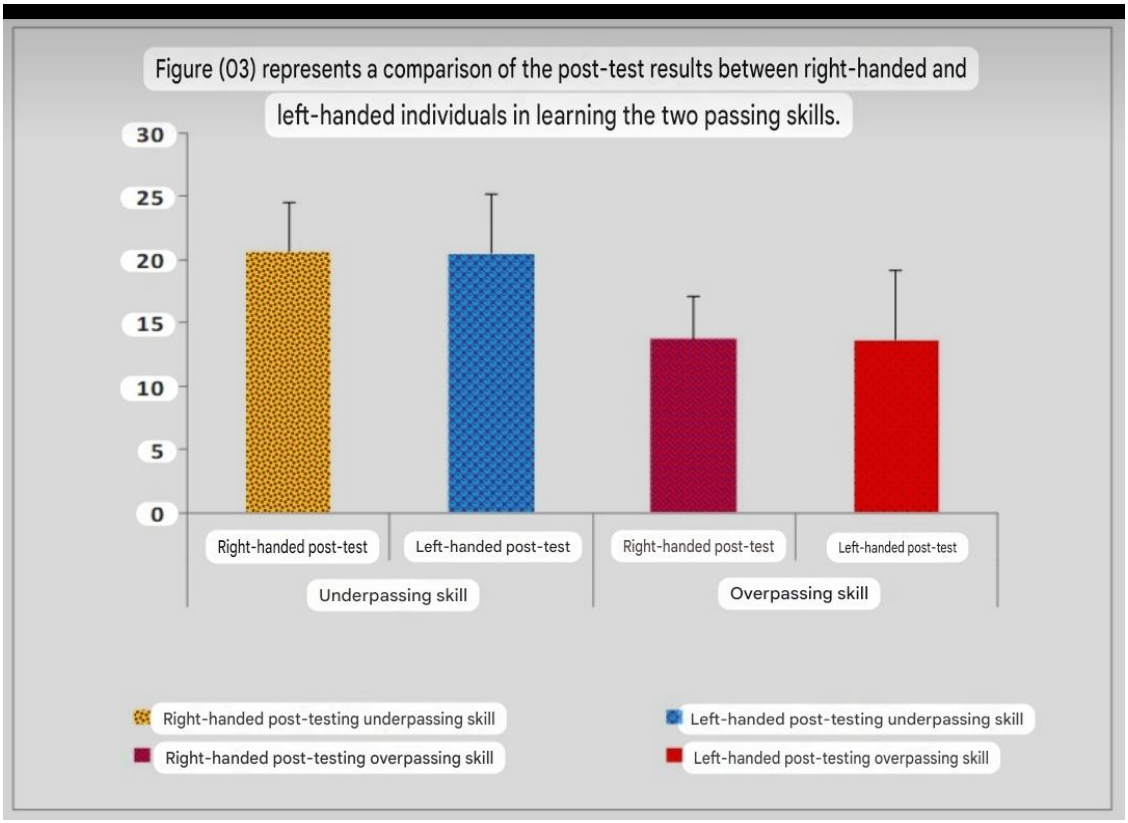
Comparing the post-test results for learning underhand and overhand passing skills between students with right and left laterality patterns.

Table No. 4 presents a comparison of the post-test results for underhand and overhand passing skills between students with right and left laterality patterns.

Tests	Post-measurement (right pattern).	Post-measurement (left pattern).	"T" value	Significance level: P ≤ 0.05
Passing skill from the bottom (number)	20.62 ±3.93	± 20.464.75	0.92	0.05
Passing skill from the top (number)	13.69±3.47	13.62± 5.47	0.96	0.05
Arithmetic mean ± standard deviation, with no statistically significant differences at the significance level P ≤ 0.05.				

As can be seen from the table above, there are no statistically significant differences in the post-test results for individuals with right or left dominance patterns when learning underhand and

overhand passing skills at a significance level of $P \leq 0.05$. This suggests that the programme has no differential effect according to type of cerebral control/dominance.



8. Discussion of the study results

The present study aimed to determine the effect of an instructional programme tailored according to cerebral control/dominance patterns on the acquisition of overhand and underhand passing skills (reception) in volleyball among second-year male university students. The statistical analysis revealed the following findings:

As can be seen from Tables 01 and 02, statistically significant differences were found between the pre-test and post-test results for both right- and left-dominant individuals. These differences were observed at significance levels of $P \leq 0.01$ and $P \leq 0.001$, respectively. The researchers attribute this to the effectiveness of the instructional programme proposed, which positively impacted learning and improved performance in overhand and underhand passing skills in volleyball. Goldberg (2001) states that the learning process activates brain growth because the density of the brain increases when it interacts with the surrounding environment through nerve cells, leading to increased interconnections among them. Furthermore, an environment rich in sensory stimuli that activates all sensory organs can promote further brain development. Furthermore, Campbell (2007) emphasises that learning results in physiological changes in the brain, characterised by a process known as brain plasticity. This allows the brain to reorganise synaptic connections between its cells according to environmental stimuli and learning processes. This means that learning and acquiring experiences are not confined to a specific stage. Therefore, the importance of training individuals is highlighted, as is the importance of increasing awareness among students and teachers of the effects of learning on the brain, and of enriching the learning environment, since such an environment helps organise brain activity.

Based on the results shown in Table 3, we found no statistically significant differences in the post-test scores between individuals with right- and left-dominant patterns. This suggests that the preference for a teaching/learning style has no effect, regardless of the cerebral control/dominance pattern. This may be because the functions of one hemisphere of the brain complement those of the other. In this regard, Afaf Al-Mohammadi (2017) emphasised that there are no differences in teaching/learning style preferences according to hemispheric brain dominance, and confirmed the absence of statistically significant differences among female science students in relation to information-processing patterns. Similarly, Ali Al-Qadoumi et al. (2018) suggested that the lack of differences between right- and left-dominant individuals is due to similarities in students' university lives, arising from the way curricula, teaching strategies and general educational policy are planned for both theoretical and practical courses. This is reflected in students being assigned the same scientific activities, resulting in no observable differences and having no effect on their brain dominance.

This absence of differences may be related to the nature of the assessment tool used in the measurement process. This is consistent with the findings of Al-Hamouri (2006) and Abdelhak et al. (2015), who confirmed that there are no statistically significant differences in cerebral dominance according to gender. Abdelhak et al. (2015) reported no such differences, attributing this to the fact that despite structural differences between male and female brains, these differences may not be significant enough to clearly reflect differences in cerebral dominance between the sexes. Regarding the relationship between the sexes in terms of brain physiology and function, some researchers argue that there are differences in brain size, number of grey and white matter cells, relative size of the cerebral hemispheres and body size between males and females. However, even with these physiological differences, the issue of cerebral dominance remains unclear.

Furthermore, the two hemispheres are interconnected yet not functionally identical: the left hemisphere converts incoming information into symbols, while the right hemisphere retrieves information as required. Thus, the brain is functionally divided into two independent parts that are unified in structure and organisation. Experimental evidence supports this, showing that it is possible to transfer information where the two cerebral hemispheres can separate during processing (Bassem Isa Al-Atoum, 2006).

Additionally, Rim Mostafa Urazyel (2012) stated that basic volleyball skills—whether defensive or offensive—require integrated brain functioning and should not be limited to one side in order to perform them correctly on the court. This further supports the connection to cerebral dominance, which is considered one of the most important topics related to thinking and learning.

(Abdel Ali al-Haqani, 2014) suggests that the brain influences and is influenced by human knowledge, considering it to be the basis of cognitive mental activity. The brain is divided into two hemispheres, which are fully integrated but differ in their functional performance: the left hemisphere specialises in certain types of activity, while the right hemisphere specialises in others. Nevertheless, they complement each other in many activities.

Brain dominance (cerebral control) over learning and thinking patterns refers to how individuals use information when solving problems. This use is carried out through the functions of the left and right hemispheres, either separately or together in an integrated manner, during these processes. Therefore, brain dominance is an essential concept for understanding the specific

functions of each hemisphere. In this context, both hemispheres are specialised to perform distinct functions that are integrated simultaneously.

Similarly, Widad Ja allah (2015) confirmed in her study that there were no statistically significant differences in brain dominance patterns according to gender (i.e. males and females). Most researchers agree on the scientific importance of sex differences in the organisation of brain functions. Although hemispheric symmetry in language function is generally greater in males than in females, or alternatively, females show less dominance than males in language-related functions, differences between the sexes in higher mental functions are often small, at approximately one-quarter of a standard deviation. This indicates substantial overlap between males and females in how cognitive abilities are distributed across the two sides of the brain. Therefore, any difference in brain dominance patterns between the sexes would be limited to a value that is not statistically significant.

It also emphasises that all brain functions are equally important and should be valued, as no part of the brain is inherently superior to another. Humans need both hemispheres in society, particularly in schools and universities. However, this does not mean that the requirements of different jobs must always be matched to a person with specific left- or right-brain dominance. In the general educational process, it is necessary to preserve and develop both sides of the brain due to the need for different thinking processes, especially divergent and creative thinking, which are often associated with the left and right sides of the brain respectively. This also ensures familiarity with all aspects of the educational process.

9. Conclusions

Based on the theoretical studies, measurements and tests conducted within the scope of the study, its characteristics, research questions and hypotheses, and the capabilities available, and in light of the study's objectives, tools and methods employed, and the accurate information collected in accordance with the scientific procedures followed in the same context, the following conclusions were reached, depending on the results of the statistical analysis:

- The instructional programme effectively and positively contributed to learning and improving performance levels in overhand and underhand passing (reception) skills. This resulted in statistically significant differences in learning the volleyball passing skills between individuals with the right dominance pattern and individuals with the left dominance pattern in the pre-test and post-test.

The instructional programme, which was tailored according to brain control/dominance patterns, showed no statistically significant differences in post-test results for learning overhand and underhand passing (reception) skills among second-year Bachelor's level university students.

10. References

- Ahmed, F. M. S. (2011). The effectiveness of a proposed programme to improve special physical abilities in the attacking spike skill among Palestinian youth volleyball players.
- Anisa, Ahmad Mahmoud Awda. (2016). 'Developing standardised levels of basic skills in volleyball among players of sports teams in public schools in Qalqilya Governorate'.
- Ayman Abdo, Mohammad and Iman, Sayed Ahmed. (2010). 'Student Evaluation Card for Volleyball'.
- Ayoub Dakhil Allah. (2015). Learning and its Theories (1st ed.). Beirut: Dar Al-Kutub Al-Ilmiyya, Lebanon.

- Alaa Ziad Mohammad Hamouda. (2015). 'Brain dominance patterns and their relationship to metacognitive thinking among Al-Azhar University students in Gaza, Palestine' (Master's thesis), Department of Psychology, Faculty of Education, Al-Azhar University, Gaza, Palestine (Published).
- Al-Atrach, Zoubir. (2008). 'The effectiveness of the blocking skill in volleyball and the extent of its impact on team performance in national competitions'.
- Bassem Isa Al-Atoum. (2006). 'The relationship of brain dominance to the academic level, the family's economic situation, place of residence and major among students of Jordan University of Science and Technology'. Dirasat: Human and Social Sciences, Vol. 33, pp. 718–731.
- Bayan Ali Abd Ali Al-Khaqani and Zafir Namus Khalaf. (2014). 'The effect of the curriculum used according to brain dominance on learning simple attack skills among female fencers'. Journal of the College of Basic Education, Issue 17, University of Babylon, pp. 319–334.
- Mohamed Al-Masry, Rim. (2015). The Effect of a Proposed Educational Programme on the Change Curve of Some Table Tennis Skills among Students of the Faculty of Physical Education at An-Najah National University (Master's Thesis). Faculty of Graduate Studies, An-Najah National University, Department of Physical Education (Published). Nablus, Palestine.
- Rim, Mostafa, Mohammad Urazyel. (2012). 'The Relationship Between Brain Dominance and the Level of Positivity Among Volleyball Players in Palestine' (Master's thesis), Faculty of Graduate Studies, An-Najah National University, Department of Physical Education (Published). Nablus, Palestine.
- Abd al-Nasir Abd al-Rahim Al-Qudoumi. (2010). 'Brain dominance among football players in Palestine'. Journal of Educational and Psychological Sciences, An-Najah National University, Palestine, Vol. 11, Issue 4.
- Ali Al-Qudoumi, Mouatasim Abu Aliya, Mohammed Al-Qudoumi and Hamid Salama. (2018). 'The Relationship Between Brain Dominance and the Preferred Side Used Among Students of the Faculty of Physical Education at Palestine Technical University–Khuduri'. An-Najah University Journal for Research (Humanities), Vol. 32, Issue 10.
- Nasser al-Din Ibrahim Abu Hammad (2017). (2017). 'The effect of an educational programme based on brain-based learning theory on developing imaginative thinking skills and visual perception among students with non-verbal learning difficulties', Vol. 25, Issue 02.
- Nidaa Ghuro Ismail Afana. (2013). 'The effect of using the bilateral brain learning strategy in teaching science on developing some habits of mind among ninth-grade female students in basic education in Gaza' (Master's thesis), Department of Curricula and Teaching Methods, Faculty of Education, Islamic University, Gaza (published).
- Widad Ja'Allah and Hanaa Al-Raqad. (2015). 'Brain dominance pattern and its relationship to self-regulated learning among eighth-grade students in Amman, Jordan'. An-Najah University Journal for Research (Humanities), Vol. 29, Issue 9.

- Abdelhak, Z. and Al-Aheli, S. (2015). 'Brain dominance and its relationship to creative thinking among university students in Jordan in the light of some demographic variables'. Journal of Educational Sciences.
- Al-Hamouri, F. (2006). 'Measuring the role of the right and left hemispheres in processing Arabic using visual field and dual-task performance methods'. Jordanian Journal of Educational Sciences.
- Al-Mohammadi, Afaf Salim. (2017). 'Brain dominance and its correlation with learning styles, choosing specialisation and academic level among university students'. International Journal of Research in Education.
- Campbell, J. (2007). 'The Arising Habits of Mind as a Framework for Learning'. Central Queensland University.
- Goldberg, E. (2001). Executive Brain. Oxford University Press.