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SPECIAL ISSUE ARTICLE

The Effect of Blended Learning Style on Certain Motor and Skill Variables in Volleyball for Female Students

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Abstract

The aim of the research was to identify the effect of the blended learning method on some motor and skill variables in volleyball among female students. The researchers followed the experimental method with a design of two equivalent groups. The research sample consisted of second-year students at the College of Physical Education and Sports Sciences, University of Babylon, totaling 28 students, equally divided into a control group and an experimental group. Considering the research results, the researchers concluded that the experimental group showed a clear superiority in post-measurements over the control group in some motor and skill variables in volleyball. The calculated (*t*) values of (8.58, 8.75, 9.14, 11.05) were greater than the tabulated value of (2.05) at a significance level of (0.05) and under degrees of freedom (26). Among the most important recommendations is the organization of joint educational units (male and female students) to learn volleyball skills and team sports and to improve motor variables among female students and this achieves one of the sustainable development goals of the United Nations in Iraq which is (Quality Education).

Keywords: Method, Blended learning, Motor, Skill

1. Introduction

Education is considered one of the most important phenomena that plays a significant role in the advancement of nations, due to its positive impact on preparing new generations based on sound and modern scientific foundations. This progress can be recognized through these nations' knowledge of modern methods, means, approaches, and theories of learning and teaching. This period witnesses' serious attempts to develop education at all stages, as the educational process has occupied a prominent place within development mechanisms, considering it a process that addresses all aspects of the learner's personality (Mourad, 2023).

University education is regarded as one of the most distinguished educational stages in students' lives, where students of both genders transition from the

school environment, with all its restrictions, circumstances, and daily details, to the university environment, which is open to both genders. University is the place where students find an educational environment prepared for mixed learning and the formation of relationships in various forms with the opposite gender. Students find themselves side by side in classrooms, courtyards, sports halls, and other university facilities. Mixing in universities has become a reality and is imposed on all students regardless of their orientations, family upbringing methods, or social customs and traditions in their different environments (Taha, 2023).

The educational process is based on blended learning, the education of males and females together in one educational environment. In addition, the combined classroom is one of the most widespread educational systems in the modern world. This system

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aims to break down traditional barriers and prepare learners to face the realities of practical life, which do not segregate the sexes. Coeducation is meant as “a system that brings students together under one roof, receives the same curricula, and is subject to the same educational and evaluation systems. This integration is not limited to the academic aspect only, but extends to social interaction, extracurricular activities, and joint dialogue” (Al-Dandashi, 2025).

Many educational and psychological studies have agreed on the existence of individual differences between students, even those who were at the same age, and those who lived in the same cultural and social environment, and in front of this reality, we cannot direct education to a group of students in the same way, as education must be diverse, dealing with students individually and close groups, including dealing with them as one group in a mixed learning method, which is one of the educational methods based on the presence of male and female students during the teaching and learning process, which is a social, educational method away from gender segregation (Shahada, 2012).

There are some variables or motor abilities required for the performance of each game, with varying degrees from one activity to another and according to specific playing specializations. Motor abilities are essential for raising the level of the learner or player in volleyball. Therefore, every learner or player needs these abilities, which work to improve skill performance, as well as help with the speed of learning and acquiring new skills and their types in a proficient manner (Alawi, 2018).

Volleyball is considered one of the popular games among the public and individuals of both genders, as it does not require many details or high financial capabilities. Additionally, it can be played in public places, and it is a favored game because it strengthens social relationships and fosters a spirit of affection among its **players** (Mohammed, 2023).

Moreover, volleyball is one of the sports that attracts the interest of many sports enthusiasts and followers. It is a game characterized by its variability in movement, as player movements change according to the situation in the game. Mastery of proper movements during offense and defense forms the foundation upon which the game of volleyball is built (Saleh, 2011).

Volleyball is also considered one of the sports that has received considerable attention from many specialists and researchers, who have conducted numerous studies and experiments using various teaching methods and environments to acquire and master its basic skills. The process of learning basic skills in volleyball, especially the skills of setting and receiving serves, does not require pure physical strength

as much as it requires accuracy, timing, and motor abilities such as eye-arm coordination, motor balance, and motor flexibility. Therefore, preparing a learning environment that integrates both male and female students may provide rich opportunities for the exchange of motor experiences, creating a qualitative balance that positively reflects on the speed of acquiring these two skills and developing the related motor variables (Ajimi, 2026).

Volleyball is one of the activities in which learning occurs according to the principles of motor learning, as its skills vary between easy and difficult, simple and complex. All skills in volleyball fundamentally depend on each other, as the performance of any skill essentially relies on the execution of another skill. Additionally, the teaching method plays a significant role in the success of the learning process. Moreover, a positive approach to learning contributes effectively to the improvement of the skill level of those motor skills intended to be learned (Nassar, 2022).

The importance of the research is manifested in activating the principle of equality and social cooperation between the sexes in a disciplined educational method, which enhances positive behavioral values, as well as providing an innovative educational method that may contribute to shortening the time of learning basic skills and increasing the efficiency of technical performance of these skills, while providing volleyball teachers with a scientific guide on how to manage educational units according to a mixed learning method and employ it to achieve the best results in motor and skill variables in volleyball.

Through the researchers' follow-up of practical lectures on volleyball and for all academic levels, they noticed that the educational environment, especially in the practical aspect, is separate between students and students, which leads to isolation of students from their fellow students and lack of benefit from their practical experience in basic skills, including the skills of preparation and receiving transmissions, and therefore the poor level of their motor and skill performance, so the researchers decided to follow a mixed learning method between students and students in the second stage and take advantage of this educational method in developing some The research hypothesis is that the mixed learning method has a positive effect on some of the motor and skill variables in volleyball for female students, as for the research areas, which were represented by second-stage students at the Faculty of physical education and Sports Sciences-University of Babylon for the period from 27/10/2025 to 12/1/2026, the experiment was conducted in the sports hall at the Faculty of physical education and Sports Sciences-University of Babylon, and the terms were defined as follows:

- **Mixed learning style:** - it is “a type of education that combines male and female or combines two stages of education in one place” (Al-Taie, 2017).
- **Mixed learning method:** - it is an educational system that brings together students in one educational institution, in which they receive educational materials within educational units without spatial separation or discrimination in the educational curriculum. (Procedural definition)
- **Kinematic variables:** “quantitative and qualitative factors or characteristics that can be measured during the execution of a movement, reflecting how competent and capable an individual is of accomplishing a certain motor substance or skill” (Rahman, 2024).
- **Acquisition:** “the process of transforming motor information and experiences from just initial irregular attempts to a relatively stable skill of the nervous system, the result of training and planned practice” (Mohammed, 2022).

2. Methods and procedures

The researchers used the experimental method to design two equal groups with tribal and dimensional measurements. The research community was determined by the 49 second-stage students at the Faculty of Physical Education-University of Babylon, and the research sample was selected randomly from the original research community, by drawing lots, with several (28) students, they were divided into two equal control and experimental groups, with (14) students for each group, and thus the percentage of the research sample is (57.14%), which is an appropriate percentage to represent the research community truly and honestly, the researchers resorted to checking the homogeneity of the research sample in the following variables: (chronological age, total length, mass) as shown in Table 1.

Table 1 illustrates that all the torsion coefficients of the individuals of the research sample are limited to ± 1), which indicates the homogeneity of the sample, and after the researchers reviewed the relevant scientific sources, the following tests were selected and used: -

1. move over the markers to measure the motor balance (Hussein, 2011).
2. motor compatibility between the eyes and arms throwing a tennis ball on the wall (Hussein, 2011).
3. technical performance of the volleyball preparation skill (Al-Dulaimi, 2024).

The researchers conducted the exploratory experiment on a group of female students, and several (6) students were selected randomly from the research community, and from outside the main research sample on 27/10/2025 at the outdoor volleyball court at the Faculty of Physical Education and Sports Sciences, University of Babylon. This experiment aimed to find out the suitability of the tests for the research sample and the suitability of the tools and devices used. As well as knowing the time taken to conduct tests, while organizing their sequence to facilitate the transition from one test to another to save time and effort and finding scientific coefficients for tests.

As for verifying the validity of the tests, the researchers turned to using the validity of differentiation by applying the tests to two groups, one of them (6) non-distinguished female students. While the second Group (6) are distinguished female students who represent the University team in volleyball for the academic year (2025-2026), these students were excluded from the main research experiment, as shown in Table 2.

Significant when the calculated values of (t) are greater than the tabular value of (202.) At an

Table 1. Illustrates the arithmetic media, standard deviations, pattern and torsion coefficient for the homogeneity of the research sample.

No.	Statistical/Parameters Variables	Arithmetic mean	Standard deviation	Mode	Torsion coefficient
1	Chronological age/year	20.43	0.72	20	0.60
2	Overall Length/cm	158.11	4.69	162	-0.83
3	Mass/kg	62.97	3.87	65	-0.52

Table 2. Presents the coefficient of differentiation validity for the tests of some motor and skill variables in volleyball.

No.	Statistical Parameters/ Motor and skill variables	Non-distinguished Group		distinguished Group		Calculated value (t)	Type of indication
		M	SD	M	SD		
1	Motor balance/degree	9.92	1.22	12.74	1.19	4.92	Moral
2	Eye-to-arm compatibility/degree	6.71	0.61	8.46	0.59	4.65	Moral
3	Technical Performance of Preparation Skill/Grade	2.92	0.74	7.15	0.41	5.09	Moral
4	Technical performance of transmission receiver/grade	3.35	0.80	7.69	0.52	7.72	Moral

Table 3. Shows the stability and objectivity coefficient of tests of some of the kinetic and skill variables in volleyball.

No.	Statistical Parameters/Motor and skill variables	Stability Coefficient	Objectivity Factor
1	Motor balance/degree	0.89	–
2	Eye-arms compatibility/degree	0.87	–
3	Technical Performance of Preparation Skill/Grade	0.86	0.84
4	Technical performance of transmission receiver/grade	0.87	0.85

Table 4. Shows the values (t) calculated in the pre-measurements of the research variables between the control and experimental groups.

No.	Statistical Parameters Motor and skill variables	Control		Experimental		Calculated value (t)	Type of indication
		M	SD	M	SD		
1	Motor balance/degree	6.81	1.63	6.52	1.38	1.24	Insignificant
2	Eye-arms compatibility/degree	6.22	0.71	6.34	0.67	0.76	Insignificant
3	Technical Performance of Preparation Skill/Grade	3.49	1.29	3.04	0.89	0.94	Insignificant
4	Technical performance of transmission receiver/grade	3.79	1.41	3.56	0.63	0.65	Insignificant

indicative level (0.05) and below a degree of freedom (10), which indicates the truthfulness of the tests.

To extract the stability of the tests, the researchers applied the tests for the first time on 27/10/2025, and then re-applied them to the members of the survey research sample of (6) female students with a time difference of (7) days, i.e., on 5/11/2025, at the outdoor volleyball court at the Faculty of Physical Education and Sports Sciences, University of Babylon. The values of the stability coefficient for the tests are as shown in Table 3. In order to confirm the objectivity of the tests, the researchers used the scores of two of the three evaluators who evaluated the technical performance of the preparation and reception skills by direct observation and then extracted the values of the simple correlation coefficient (Pearson) between their scores, as shown in Table 3.

Tribal measurements of the control and experimental groups were conducted on 10/11/2025 at the outdoor volleyball court at the Faculty of physical education and Sports Sciences-University of Babylon, after the implementation of two initial educational modules, in which the skills of preparation and receiving the transmission were explained after using the ideal live model in the presentation of the two skills, and then the research sample applied these two skills during the two educational modules, and at the end of the second educational module, tribal measurements of the research variables were the equivalence of the control and experimental research groups in the tests of all search variables, as shown in Table 4.

Table 4 shows that the calculated values of (t) were smaller than the tabular value of (2.05) at an indicative level (0.05) and below a degree of freedom (26), which indicates that there are no significant differences in the tribal measurements of some motor variables and

skill in volleyball, which indicates the equivalence of the control and experimental groups.

The researchers applied the vocabulary of the mixed learning method, by introducing a group of (7) students from the second stage who are characterized by good technical performance of my skills to prepare and receive the volleyball transmission with the experimental research group, as (7) groups were formed, each group includes (one and two students) to help the students apply the exercises of motor and skill variables, the educational curriculum took (8) weeks, with (2) two units per week, the total educational units amounted to (16) units for each skill (8) educational units, as for the time of the educational unit (90) minutes, the researchers adopted the main section of it with a time of (60) Minutes, and the control group carried out the same vocabulary of the group After completing (16) educational units in a period of (8) weeks, the dimensional measurements of the experimental and control groups were carried out on 12/1/2026 at the outdoor volleyball court at the Faculty of physical education and Sports Sciences-University of Babylon, under the same conditions as the tribal measurements to obtain research results using statistical means (Al-Dulaimi, 2022):-(percentage, for arithmetic mean, standard deviation, loom, torsion coefficient, Test (t) for symmetric samples, and for independent samples).

3. Result

Significant when the calculated value of (t) is greater than its tabular value of (2.16) at the significance level (0.05) and below the degree of freedom (13).

Significant when the calculated value of (t) is greater than its tabular value of (2.16) at the

Table 5. Shows the value (t) calculated between the pre- and post-measurements of the research variables of the control group.

No.	Statistical Parameters Variables	Pre-test		Post-test		Calculated value (t)	Type of indication
		M	SD	M	SD		
1	Motor balance/degree	6.81	1.63	12.74	1.19	3.89	Moral
2	Eye-arms compatibility/degree	6.22	0.71	8.46	0.59	4.57	Moral
3	Technical Performance of Preparation Skill/Grade	3.49	1.29	5.56	0.87	6.11	Moral
4	Technical performance of transmission receiver/grade	3.79	1.41	5.43	1.07	4.29	Moral

Table 6. Shows the value (t) calculated between the pre- and post-measurements of the research variables of the experimental group.

No.	Statistical Parameters Variables	Pre-test		Post-test		Calculated value (t)	Type of indication
		M	SD	M	SD		
1	Motor balance/degree	6.52	1.38	9.97	1.22	3.67	Moral
2	Eye-arms compatibility/degree	6.34	0.67	7.75	0.61	3.82	Moral
3	Technical Performance of Preparation Skill/Grade	3.04	0.89	7.43	0.81	4.22	Moral
4	Technical performance of transmission receiver/grade	3.56	0.63	7.21	0.82	3.89	Moral

significance level (0.05) and below the degree of freedom (13).

It is significant when the calculated value of (t) is greater than its Tabular value of (2.05) at an indicative level (0.05) and below a degree of freedom (26).

Through the results presented in Tables 5 and 6, which show that there are significant differences between the tribal and dimensional measurements of the control and experimental groups of some motor and skill variables in volleyball and in favor of the dimensional jumpers and for both groups, the researchers attribute the reason for the significance of these differences to the dependence of the control group on the method it is caused by repetition and practice, however, it lacks the accuracy that is available in the blended learning style 'This is confirmed in the fact that repetition alone without various feedback is not enough to reach the stage of high motor proficiency, especially in skills that require precise compatibility, such as volleyball, "he said" (Schmidt, 2018).

As for the results of the experimental group in Table 6, the researchers attribute the reason for the significant differences between the tribal and dimensional measurements to the effectiveness of the mixed learning method, as the inclusion of the sexes in the educational units together provided a competitive environment that stimulated female students to simulate rapid performance, which led to superiority in the results of dimensional measurements, which is consistent with what was indicated in "that the diversification of practice conditions enhances the ability of the nervous system to retain and develop skill". (Schmidt, 2018).

The mixed learning method also provided an active learning environment that took the student out of the

role of a passive receiver to the role of an active participant, which led to the acquisition of both skills, as the students showed a high ability to harmonize their movements in the skills of preparation and receiving transmissions, and the distribution of muscle effort in their performance through repetition and practice, which proves the effectiveness of the mixed learning method in improving the Associated motor performance variables, and this was emphasized in that "repetition and practice in the environment of practical application is not just a restoration of movement, but a continuous refinement of the motor program, as these the learner self-detects and corrects errors, which enhances the efficiency of motor acquisition" (Schmidt, 2018).

The researchers attribute the improvement in the performance of the female students in the experimental group as a result of social facilitation, as the presence of students led to an increase in the level of self-motivation among the female students towards acquiring the technical performance of the two skills (preparation and reception of transmissions) to narrow the skill gap, as well as the direct interaction strength and speed, which contributed to the improvement of some motor variables (motor balance and compatibility). This is consistent with what was emphasized in "that the educationally organized mixed style contributes to raising the level of motor ambition in females" (Lirgg, 1991).

The researchers also attribute the improved performance of female students in the skills of preparation and receiving transmissions to the so-called (differentiated training), through interaction with students, the female students faced motor challenges represented by receiving balls with high speed and

Table 7. Shows the value (t) calculated in the dimensional measurements of some of the research variables between the control and experimental groups.

No.	Statistical Parameters/Variables	Control		Experimental		Calculated value (t)	Type of indication
		M	SD	M	SD		
1	Motor balance/degree	9.97	1.22	12.74	1.19	8.58	Moral
2	Eye-arms compatibility/degree	7.75	0.61	8.46	0.59	8.75	Moral
3	Technical Performance of Preparation Skill/Grade	6.43	0.81	7.55	0.61	9.14	Moral
4	Technical performance of transmission receiver/grade	6.21	0.82	7.69	0.73	11.05	Moral

strength, which led to a noticeable improvement in motor variables, and this interaction not only improved the final result of performance, but also developed technical performance(technique) through observation and live Motor modeling of fellow students, and this is consistent with what was stated in that “the educational environment that provides various motor challenges accelerates the acquisition process and makes the skill more resistant to forgetting, and the educational environment which gives the learner an opportunity to observe motor models Variety contributes to the acceleration of the process of building a mental representation of the skill, which leads to improved accuracy of motor performance and reduced mental effort expended.” (Magill, 2017).

The researchers believe that the dysfunctional learning method is not just a technical means, but an integrated educational and social method, as the presence of students with female students in an organized educational framework led to the creation of positive motor challenges that contributed to the acquisition of the skills of preparation and reception of sending volleyball by improving the motor variables, which made the mixed learning method the most suitable for the preparation of students with skill competence and the ability of social adaptation.

4. Conclusion

The researchers reached several conclusions, which are as follows:

1. The blended learning method has a positive role in some motor variables (motor balance and eye-hand coordination) and skill variables (setting and receiving the serve) in volleyball for female students.
2. The applied learning method achieved a significant superiority in the post-measurements of some motor variables (motor balance and eye-hand coordination) and skill variables (setting and receiving the serve) in volleyball for female students.
3. The experimental group showed a clear superiority in the post-measurements over the control

group in some motor and skill variables in volleyball, as the calculated (t) values (8.58, 8.75, 9.14, 11.05) were greater than the tabulated value (2.05) at a significance level of (0.05) and under degrees of freedom (26).

The researchers recommend the following:

1. Organizing joint educational units (male and female students) to learn volleyball skills and team sports, and to improve motor variables among female students.
2. Applying the blended learning method during educational units to acquire volleyball skills as well as other team sports skills.
3. Conducting research addressing the use of the blended learning method on some other capacities (physical, psychological, and social) among female students.

Author's declaration

Conflicts of interest

None

We confirm that all tables and figures in this article are ours and written by the researchers themselves.

Ethical-clearance

This manuscript approved by the Scientific Committee of the College of Physical Education and Sports Sciences for Women, University of Baghdad, Iraq, on (2024/10/01).

Author's contributions

All contributions to this study were carried out by the listed authors. Prof. Dr. Najlaa Abbas Al-Zuhairi contributed to the study design, supervision of the research procedures, and final revision of the manuscript. Prof. Dr. Nihad Mohammed Alwan contributed to data collection, organization, and implementation of the experimental program, as well as drafting the manuscript. Prof. Dr. Liza Rustum

Yaqoob contributed to data collection, implementation of the experimental procedures, and preparation of the initial draft of the manuscript. Asst. Prof. Dr. Missaa Nadem contributed to data organization and analysis. Prof. Dr. Yousra Juma Al-Sinani contributed to reviewing, editing, and finalizing the manuscript.

The study also benefited from the assistance of a number of experts: Dr. Aayed Al-Nusairi (Statistics), Dr. Ameera Mahmoud and Dr. Hanan Abdel Latif (Revision), and Asst. Prof. Dr. Fatimah Mohammed Al-Asadi (Translation), Directorate of Scholarships and Cultural Relations, Ministry of Higher Education and Scientific Research.

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Roles of each researcher in the research

First researcher: Prof. Dr. Najlaa Abbas Al-Zuhairi was responsible for the conceptualization of the research idea, study design, supervision of the research procedures, interpretation of the results, and final revision of the manuscript.

Second researcher: Prof. Dr. Nihad Mohammed Alwan participated in data collection, organization, and implementation of the experimental program, and contributed to drafting the manuscript.

Third researcher: Prof. Dr. Liza Rustum Yaqoob contributed to data collection, implementation of the experimental procedures, and preparation of the initial draft of the manuscript.

Fourth researcher: Asst. Prof. Dr. Missaa Nadem assisted in data organization, statistical processing, and interpretation of results.

Fifth researcher: Prof. Dr. Yousra Juma Al-Sinani contributed to reviewing, editing, and finalizing the manuscript.

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Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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تأثير أسلوب التعلم المدمج في بعض المتغيرات الحركية والمهارية في الكرة الطائرة لدى الطالبات

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جامعة بابل، كلية التربية البدنية وعلوم الرياضة، العراق

الخلاصة

هدف البحث إلى التعرف على تأثير أسلوب التعلم المدمج في بعض المتغيرات الحركية والمهارية في الكرة الطائرة لدى الطالبات. اعتمد الباحثون المنهج التجريبي بتصميم المجموعتين المتكافئتين. وتكوّنت عينة البحث من طالبات المرحلة الثانية في كلية التربية البدنية وعلوم الرياضة بجامعة بابل، والبالغ عددهن (28) طالبة، قُسمن بالتساوي إلى مجموعة ضابطة وأخرى تجريبية. وأظهرت نتائج البحث تفوقاً واضحاً للمجموعة التجريبية في القياسات البعدية مقارنة بالمجموعة الضابطة في بعض المتغيرات الحركية والمهارية في الكرة الطائرة، إذ كانت قيم (ت) المحسوبة (8.58، 8.75، 9.14، 11.05) أكبر من القيمة الجدولية البالغة (2.05) عند مستوى دلالة (0.05) ودرجة حرية (26). ومن أبرز التوصيات تنظيم وحدات تعليمية مشتركة (للطلاب والطالبات) لتعلّم مهارات الكرة الطائرة والألعاب الجماعية، بما يساهم في تحسين المتغيرات الحركية لدى الطالبات. وهذا يحقق أحد أهداف التنمية المستدامة للأمم المتحدة في العراق وهو (التعليم الجيد)

الكلمات المفتاحية: المنهج، التعلم المدمج، الحركية، المهارة.