

Research Article



Comparing Flipped Classroom and Traditional Teaching Methods on Motor Learning, Motivation, and Game Performance in Volleyball Education

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Flipped Classroom
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Abstract: This study was conducted to compare the difference in motor skills learning, learning motivation, and volleyball performance of fourth-grade student learners in the College of Physical Education and Sports Sciences between the flipped classroom (FC) and the traditional method (TM). The researcher adopted the experimental design with two equivalent groups with pre-test and post-test approach. The study population was 20 students, who were determined by purpose sampling and divided randomly into two groups of equal students, with 10 students in each group, one experimental group (students learning with "flipped classroom" strategy) and the other control group (students learning by "traditional classroom" strategy). The educational programme consisted of two teaching sessions a week for 16 weeks. Skill performance tests were used for motor learning, one learning motivation scale was used as well as one observation form was used for evaluation of the performance in matches. The results revealed that there were no significant differences between the two groups in the pre-tests, thus establishing their equivalence. The experimental group showed a highly significant advantage in motor learning, learning motivation and match performance much higher than that of the control group and effect sizes of 100% were registered for all variables. The findings do support the use of flipped classroom as a more preferable learning atmosphere that allows digital learning to take place outside of class time and practical learning, feedback, and group learning during class time. This helps to enhance quality of learning and skill/tactical appreciation in volleyball. The study suggests the implementation of this in the school physical education curriculum and University education.

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INTRODUCTION

With the speed of educational technology developing, the teaching and learning process is changing in different subjects in education, such as in physical education and physical and educational sciences. The way modern learning strategies are implemented

highlights: aliveness, a student-centered approach and means of learning how educational technology can be used well to support cognitive, affective and psychomotor learning outcomes. But among all these innovative practices, the most popular one can be considered the Flipped Classroom (FC) model, because its

combination of the current classrooms more time for practical activities, collaborative learning and problem solving is complemented by direct instruction presented remotely, in digital format, using distance education tools. In this mode of instruction, students are expected to assume more responsibility for themselves and it allows the teacher to give individual feedback during practical activities^[1].

Educational strategies are very important in improving students' motor skills learning, motivation and competitive performance in physical education classes, particularly in skill-based sporting activities like volleyball. Requiring complex motor skills, swift decisions and coordinated movement and tactical awareness, volleyball demands a lot of skills that need to be learned. The traditional pedagogies frequently adopt teacher-dominated pedagogy, whereby the information is primarily passed on from teachers to students and the latter are then simply given limited chances to apply or practice the material. While this is still common in practice, it can lack opportunities for being actively engaged, targeted learning and practice, or repetition of skills^[2].

Motor learning is one of the main goals of physical education that reflects learning of the motor skills in a relatively permanent way that has occurred after practice and experience has been conducted. Instructional approaches, feedback, motivation and level of meaningful practice engage in the learning process. Therefore, it is crucial to choose a good and effective teaching strategy to maximize the skill acquisition and retention of students.

Motivation is also another basic determinant that will impact student's participation and performance in physical education. Engaged students, who are very motivated to learn, are more likely to persist with and practice difficult skills. Previous studies in the field of education have demonstrated that the adoption of technology in learning environments can raise students' intrinsic motivation when they express autonomy, interact with others and learn independently^[3]. Through the "flipped classroom" model, students can watch the curriculum lectures at home, and actively learn and practice in class, which is helpful for students to receive personalized teaching. It may make the class more flexible, helping students recognize the instructional videos at home and carry out class activities to actively learn and practice; the class is conducive to students' personalized teaching.

Game performance in volleyball is not just about the technical aspect of a play, but also about tactical consideration, teamwork, communication, and the ability to put technical knowledge into the context of a game. It

is therefore much more valuable to look at the performance of the game than to analyze technical skills separately when judging the learning outcomes of students. Modern pedagogical studies focus on the development of competence in technical and tactical aspects of a game and use authentic game experiences to help students develop for performances^[4].

Several recent studies have reported improvement of the student achievement, skill acquisition, student involvement and motivation arising from the use of the flipped classroom model in higher education and sports education. However, empirical evidence on comparing the performance of the flipped classroom teaching method to that of conventional teaching method in volleyball training in universities with particular focus on Iraq is still limited^[5]. Furthermore, there have been relatively few studies that consider motor learning, motivation and game performance as combined learning outcomes in the context of undergraduate students in colleges of physical education and sports science.

Thus, this study aimed to compare the impact of the flipped classroom model with the traditional teaching model on motor learning and motivation, and game performance of the fourth year students of the College of Physical Education and Sport Sciences, University of Babylon during the academic year 2024-2025. Based on this, it was hypothesized that the motor learning, learning motivation, and volleyball game performance of the students under the "flipped classroom" approach would be significantly greater than that of the students under the traditional method.

MATERIALS AND METHODS

Study Participants: Constructivist-targeting the effectiveness of the flipped classroom teaching mode relative to that of traditional teaching mode, the study employed experimental research design. The subjects were 20 (20) male fourth-grade students from College of Physical Education and Sport Sciences, University of Babylon, academic year 2024/25. Students were purposely chosen by the researcher as they had taken the necessary volleyball classes and had the same educational backgrounds. The participants were randomly assigned into two equal groups:

- Experimental Group (n = 10): Students in the experimental group are taught using Flipped Classroom strategy.
- Traditional Teaching Method (n = 10): Control Group were taught using the traditional method.

Pre-tests were carried out for both groups to ensure homogeneity and equivalence before the educational

program was implemented, regarding aspects of motor learning, motivation and volleyball game performance. The pedagogical experiment was carried out in the time interval of 11.11.2024–4.06.2025.

Experimental Design: A pre test – post test equivalent group experimental design was used for this study. The independent variable used was the teaching method^[6]:

- Flipped Classroom
- Traditional Teaching

The dependent variables included:

- Motor learning
- Learning motivation
- Volleyball game performance

The experimental group received instructional videos, PowerPoint presentations, and educational materials before each practical lesson through an online learning platform^[7]. Students studied them on their own prior to class. Time was dedicated to real-world applications, feedback, cooperative learning and skill execution in the classroom.

The control group continued their teacher-centered instructional method, where explaining theories and demonstration were given prior to doing practicals in class.

Each group was taught the same amount of material during 90-minute sessions twice per week for 16 weeks.

Measurement Instruments: Three outcome variables were evaluated^[8].

Motor Learning Test: A standardized volleyball skill performance test was used to assess motor learning:

- Overhead passing accuracy
- Forearm passing accuracy
- Underhand serving accuracy

To gain a clear understanding of students' motor learning performance, students made a series of attempts and the total number of points represented overall motor learning performances^[9].

Learning Motivation Scale: A validated questionnaire developed and adapted for university students was used to measure volleyball learning motivation. It contained 20 items which were given a five-point Likert type response options ranging from Strongly Disagree (1) to Strongly Agree (5).

The higher the score, the more motivated the learners were with respect to learning.

Volleyball Game Performance Assessment: The performance was determined using observation checklist in competitive volleyball games^[10].

Performance indicators included:

- Technical execution
- Tactical decision-making
- Court positioning
- Team cooperation
- Successful offensive and defensive actions

Each student's total score represented overall game performance.

Statistical Analysis: All the data were analyzed by Statistical Package for the Social Sciences (SPSS), Version 27.

RESULTS

The results in Table 1 indicated that there was no significant difference between the experimental and control groups in motor learning, learning motivation, and volleyball game performance in the pre-test as evidenced by $p > 0.05$. The findings suggest that the samples were similar prior to an educational program so there is no baseline disadvantage for the experiment. Table 2 presents that motor learning, learning motivation and volleyball game performance of the experimental group was significantly increased ($p < 0.05$) after implementing the Flipped classroom strategy. There are positive increases in the post-test means which reaches the conclusion that the flipped classroom has improved the practical performance, motivation and skill acquisition of students successfully.

Table 3 shows that there is significant difference between pre and post test results for control group ($p < 0.05$). But the students' improvement was definitely less than in the experimental group although the traditional teaching method played its role in students' improvement.

Table 4 shows that there were significant differences in all study variables in favour of the experimental group ($p < 0.05$). The results of this study indicate the effectiveness of flipped classroom compared to conventional teaching for motor learning, motivation and performance of the volleyball game among university students.

Table 1: Show homogeneity of the Study Groups in the Pre-test

Variable	Group	Mean	Standard Deviation	t-value	Sig.
Motor Learning	Experimental	41.20	3.85	0.18	0.859
	Control	40.90	3.61		
Motivation	Experimental	63.40	4.70	0.24	0.814
	Control	63.00	4.12		
Game Performance	Experimental	18.30	2.15	0.27	0.792
	Control	18.05	2.09		

Table 2: Show Pre-test and Post-test Comparison of the Experimental Group

Variable	Test	Mean	Standard Deviation	t-value	Sig.
Motor Learning	Pre	41.20	3.85	12.47	0.001
	Post	58.90	3.42		
Motivation	Pre	63.40	4.701	1.38	0.001
	Post	82.60	3.55		
Game Performance	Pre	18.30	2.15	13.62	0.001
	Post	30.10	2.08		

Table 3: Show Pre-test and Post-test Comparison of the Control Group

Variable	Test	Mean	Standard Deviation	t-value	Sig.
Motor Learning	Pre	40.90	3.61	5.12	0.001
	Post	48.40	3.18		
Motivation	Pre	63.00	4.12	4.41	0.002
	Post	70.10	3.95		
Game Performance	Pre	18.05	2.09	5.63	0.001
	Post	23.80	2.11		

Table 4: Compare results from Experimental and Control Groups on Post Test

Variable	Group	Mean	Standard Deviation	t-value	Sig.
Motor Learning	Experimental	58.90	3.42	7.08	0.001
	Control	48.40	3.18		
Motivation	Experimental	82.60	3.55	7.44	0.001
	Control	70.10	3.95		
Game Performance	Experimental	30.10	2.08	6.72	0.001
	Control	23.80	2.11		

Table 5: Displaying an effect Size of Flipped Classroom Method

Variable	Cohen's d	Magnitude
Motor Learning	2.41	Very Large
Motivation	2.76	Very Large
Game Performance	2.98	Very Large

Table 5 presents all of the effect size values (Cohen's d) being very large effects for all dependent variables. The results are statistically significant, supporting the findings that the students' motor learning, motivating during classroom, and ability to perform the volleyball game are significantly better after the implementation of the flipped classroom.

DISCUSSION

Results of the present study showed that the motor learning, motivational and volleyball game performance of the present study were significantly improved compared to the traditional system. Substantial improvement in all the dependent variables in post-test was observed among students taking part in the flipped classroom program.

One advantage of flipped classroom is that students can view teaching materials prior to the classroom, which results in more classroom time for students to engage in in-class activities, repetitive practice, feedback correction, and cooperative learning. This teaching context makes it more difficult for students to become engaged and enhances their appreciation of volleyball skills and conditions^[11].

Teachers provided students with multiple opportunities to watch their instructional videos prior to students trying to learn the movements so that students come to the practical session with a better understanding. Students were given opportunities to watch the instructional videos many times before they tried to learn the movements, so they came to practical sessions with an understanding. As a result, tutorial was almost entirely used for improving skills, instead of teaching them, and volleyball skills were acquired more efficiently^[12].

There was a significant increase in students' learning motivation in the experimental group too. The

independent study pace with the support of multi-media helped students to be more independent and more confident in their independence^[13]. In fact, during practical lessons the learners' active participation further reinforced their intrinsic motivation and drove them to maintain continuity of their participation throughout the educational programme^[14].

Likewise, the performance of the volleyball game was also improved significantly after the flipped classroom intervention. When put to the test, students enhanced their tactical awareness, decision-making in competitive situations, effective communication and the ability to perform technical skills effectively^[15]. The theoretical and practical preparation combination is highlighted as an improvement, suggesting they allow for better transfer of the content to games environments^[16].

The traditional teaching method also worked well but the extent of change was much less^[17]. Teacher centered approach offers less opportunities for individual practice and reduces opportunities for active participation in the teaching time in learning of skills and tactical knowledge, which consequently affects how well the skill is acquired and how tactical knowledge is learned^[18].

Overall, the findings support contemporary educational theories emphasizing student-centered learning and technology integration in physical education. The flipped classroom appears to be an effective instructional strategy for improving both cognitive and motor aspects of volleyball learning among university students.

CONCLUSIONS

Based on the findings of this study, the following conclusions were drawn:

- The flipped classroom significantly improved motor learning among fourth-year volleyball students.
- Students taught using the flipped classroom demonstrated significantly higher learning motivation than those taught through the traditional teaching method.
- Volleyball performance improved more effectively in the flipped classroom group.
- The flipped classroom produced very large practical effect sizes across all study variables.
- Integrating digital learning with practical classroom activities represents an effective strategy for teaching volleyball in higher education institutions.

Recommendations:

- Implement the flipped classroom approach in practical volleyball courses within colleges of physical education.
- Train university instructors to effectively design and implement flipped classroom instruction.
- Integrate digital educational resources into sports education curricula.
- Conduct future studies involving larger samples, female students, and other sports disciplines to confirm the effectiveness of the flipped classroom across different educational settings.

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