Effect of motor learning methods on improvement of basic skills in novice handball players

Efecto de los métodos de aprendizaje motor en la mejora de las habilidades básicas en jugadores novatos de balonmano

Authors

Noor Dheyaa Abdulhameed [1]

[1] University of Alturath, Iraq

Corresponding author:
Noor Dheyaa Abdulhameed
nour.deyaa@uoturath.edu.iq

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Abstract

Background: Handball requires high motor coordination and basic skill mastery, and motor learning methods effectively enhance performance among novice players.
Objective: This study aimed to examine the effect of motor learning techniques on improving basic handball skills in novice junior players.
Methods: An experimental design was employed with a sample of 60 novice handball players aged 10–15 years, randomly assigned to an experimental group (n = 30) and a control group (n = 30). The experimental group followed a six-week training program based on motor learning principles, while the control group received traditional training. Data were collected using a validated Handball Skills Assessment Scale. Statistical analyses included means, standard deviations, Cronbach's alpha, and independent t-tests.
Results: The results revealed statistically significant differences ($p \leq 0.05$) in favor of the experimental group, which achieved higher post-test mean scores in basic handball skills compared with the control group.
Discussion: The findings indicate that motor learning techniques enhance player engagement, feedback utilization, skill integration, and teamwork, leading to superior learning outcomes compared to conventional methods.
Conclusion: Motor learning methods are effective in improving basic handball skills among novice players and are recommended for inclusion in youth training programs to optimize skill development and performance.

Keywords

Skill acquisition; psychomotor performance; instructional design; motor control; practice scheduling.

Resumen

Antecedentes: El balonmano requiere un alto nivel de coordinación motora y dominio de habilidades básicas, y los métodos de aprendizaje motor mejoran eficazmente el rendimiento de los jugadores novatos.
Objetivo: Este estudio tuvo como objetivo examinar el efecto de las técnicas de aprendizaje motor en la mejora de las habilidades básicas del balonmano en jugadores juveniles novatos.
Métodos: Se empleó un diseño experimental con una muestra de 60 jugadores novatos de balonmano, con edades comprendidas entre 10 y 15 años, distribuidos aleatoriamente en un grupo experimental (n = 30) y un grupo de control (n = 30). El grupo experimental siguió un programa de entrenamiento de seis semanas basado en principios de aprendizaje motor, mientras que el grupo de control recibió un entrenamiento tradicional. Los datos se recopilaron mediante una Escala de Evaluación de Habilidades de Balonmano validada. Los análisis estadísticos incluyeron medias, desviaciones estándar, el coeficiente alfa de Cronbach y pruebas t independientes.
Resultados: Los resultados revelaron diferencias estadísticamente significativas ($p \leq 0.05$) a favor del grupo experimental, que obtuvo puntuaciones medias postest más altas en las habilidades básicas de balonmano en comparación con el grupo de control.
Discusión: Los hallazgos indican que las técnicas de aprendizaje motor mejoran la participación de los jugadores, el uso de la retroalimentación, la integración de habilidades y el trabajo en equipo, lo que conduce a resultados de aprendizaje superiores en comparación con los métodos convencionales.
Conclusión: Los métodos de aprendizaje motor son eficaces para mejorar las habilidades básicas del balonmano en jugadores novatos y se recomienda su inclusión en programas de entrenamiento juvenil para optimizar el desarrollo de habilidades y el rendimiento.

Palabras clave

Adquisición de habilidades; rendimiento psicomotor; diseño instrucciona; control motor; programación de la práctica.

Introduction

Handball is a complex team sport where participants must continuously integrate technical-execution and tactical-decision making while time and space demands are applied. Positive play is largely dependent on the acquisition of basic motor skills, including passing, shooting, receiving and defensive positioning that require a high level of motor coordination as well perceptual awareness and cooperation between players. Especially for beginners and junior players, the sooner these general abilities are developed, the earlier the basis for further athletic development and long-term success in badminton is laid (Shidiq et al., 2019; Jukic et al., 2019; Damasceno et al., 2025).

Recently, studies dealing with handball teaching have been focusing more and more on the importance of systematic teaching contents in increasing learning efficiency and transference of skills. Research on handball training methods have shown in different studies that trainings based to motor learning principles (e.g., variable practice, augmented feedback, task-oriented exercises) can increase technical proficiency and game performance more than typical repetitive or traditional model of instruction and training (Henigman & Ohnjec, 2022; ÇAKIT et al., 2022; Espoz-Lazo et al., 2023). These methods also facilitate the training of perceptual–cognitive abilities which are necessary to make decisions in real-game situations as well as for motor execution.

In addition to handball, other team sports have provided evidence of the effectiveness of similar pedagogical means. In football, basketball and volleyball studies have already demonstrated that motor learning–based interventions, cooperative learning atmosphere and feedback approach to instruction lead to better skill acquisition and tactical understanding while ensuring enhanced participation of young athletes in sports (Williams & Hodges, 2005; Raiola, 2017; Larkin et al., 2022; Hassan & Abdulkareem, 2025). These findings may imply that pedagogical strategies concerning focus, interaction, and contextual variability can be adopted in a number of team sports with similar biomechanical/tactical requirements.

Yet, in the face of an expanding motor learning literature regarding how to guide skill acquisition, many youth coaches still employ typical instructive techniques emphasizing blocked repetition and constrained feedback. This resistance to modern training methods might impede learning and subsequent long-lasting development among novice players (Fasold et al., 2021). To our knowledge, no empirical evidence still to date has evidenced the evidence value of motor learning protocols within youth handball and no information on young professional handball is available regarding them.

We thus aimed to examine the impact of motor learning–based training on the acquisition of fundamental handball skills in young novice players. Based on pedagogical principles that have been confirmed in handball-specific research as well as other team sports, this study may provide coaches and physical education teachers with evidence-based guidelines to develop more effective, developmentally appropriate training programmes.

Method

Study Design

The present study applied statistical contrast to investigate the potential performance effect on novice practitioners of handball, overall level between different groups and the impact of what we proposed may be termed motor learning based methods. This procedure separates subjects into two groups, one that receives training grounded in motor learning principles and another that continues to be educated as before i.e., with no modification of instructional delivery This experimental design permits analysts to compare results across individuals within the same community.

Participants

The participants in the present study were 60 inexperienced junior handball players (10–15 years of age) recruited from school physical education settings. All players were beginners with less than 1 year of formal handball practice and no experience of previous organized club-competition involvement. The sample size was limited to male students, providing a homogeneous group with regard to gender-related physical and motor aspects.

The participants gave informed consent to the study approved by the ethical committee of Baghdad University before participating. Since all subjects were minors, the purpose and procedures of the study as well as potential benefits and risks were explained to parents or legal guardians in detail, and written informed consent was secured before data collection. All participated on a voluntary basis, and the research was conducted in accordance with ethical principles for research with human subjects.

The choice to select beginner novices, instead of experienced club-level players, was made on purpose and was also consistent with the study's principal aim, which aimed to investigate how different motor learning principles demarcated acquisition in basic handball skills. Motor learning interventions have been shown to have the greatest impact early in skill acquisition when participants are developing basic movement patterns and perceptual–motor representations. The addition of experienced athletes would have potentially introduced confounding effects of prior training adaptations and tactical familiarity.

Participants were randomly assigned to an experimental condition (n = 30) or a control condition (n = 30). Because the intervention and control groups did not exhibit differences in some anthropometric (e.g., age, height, body mass) as well as physical performance parameters (i.e., shooting accuracy) at baseline, these values are shown for their representativeness. There were no significant differences between groups in these variables as confirmed by statistical analysis, suggesting successful group matching and comparability at baseline, as shown in table 1.

Table 1. Baseline equivalence of experimental and control groups on anthropometric and performance measures

Test or measurement	Control group		Experimental group		P Value
	Mean	S.D.	Mean	S.D.	
Weight/kg	35.626	1.356	35.626	1.623	0.163*
Height/cm	130.56	3.526	130.56	3.451	0.091*
Shooting accuracy	5.698	0.658	5.698	0.589	0.421*

*: non-significant at p>0.05

Participants were aged 10-15 years an age span that falls within different competitive age divisions; however, all participants had a relatively novice status and low technical ability. The use of random allocation formed an age matched (i.e., minimised bias due to age) experimental and control groups to ensure that any effects observed were attributed predominantly to the training intervention itself.

Procedures

Before start of the training plan, we picked a random sample of ten juniors to test out the many different parts of the plan, this exploratory experience concentrated on building up early impressions about players and how the techniques work their effectiveness in practice. At the end of this trial period, player and coach feedback helped us to re-evaluate the plan and adjust activities to better satisfy players. So, we would be well equipped before implementing on a large scale.

Training Protocol

The training program was designed and implemented over a period of six weeks, with two sessions per week, each lasting 40 minutes. Each session was dedicated to developing a specific motor skill in novice handball players, employing modern motor learning principles such as immediate feedback, learning through play, distributed practice, and cooperative learning. Each training session followed a structured format: warm-up, skill instruction, guided practice, application in game-like contexts, and cool-down, as shown in table 2.

The first session (January 5, 2025) of Week 1 was devoted to shooting skills with offensive strategy drills and small group practices usin First Session (January 5, 2025) – Week One Today was all shooting skills with some offensive strategy drills and small group practices utilizing the transocue devices to make them more accurate and faster. The 2nd session (9th of January, 2025) was dedicated to attacking play during integrated shooting-passing exercises with experimental and real-time feedback.g transocue devices to maximize their accuracy and speed. The second session (9 January 2025) focused on attacking during integrated shooting-passing exercises, involving both experimental play and real-time feedback.

The event from week 2 (January 12), targeted reception skills via collaborative activities cross-curricula to foster teamwork and motor co-ordination. The second session, on January 16th, was an offensive

skill development day where we went down the line with guys and identified things they weren't good at, then practiced those skills.

Week 3 featured skill integration. The former (19 January) involved scenario-driven group practices under high levels of realism simulating competitive matches, and the latter (23 January) revolved around small-sided games that enforce team work in decision-making on top of problem-solving while playing.

Session one in week 4 (26th January) emphasized error optimization, helping players to be able to identify and rectify performance errors with structured feedback. " Watkins and I say that we have " performance drills perfectly adapted stages of campaign" and a "complete scale demonstration game".

Week 5 was the start of applied games. The first meeting (2nd February) took place in a highly competitive match, and we gave immediate feedback during play. The second session (February 6) presented several learning strategies such as distributed practice and playful learning for skills consolidation.

The 6 week was the last phase, and it was where students were evaluated and applied. The first session (9 February) consisted of a full skills assessment (shooting, passing and receiving) with validated measurements followed by individual feedback. In the last session (February 13), students participated in competitions, performance assessment and farewell to consolidate their learning progress and discuss follow-up training plans.

Table 2. Timeline of the training plan based on motor learning techniques

Week	Session	Date	Focus	Time	Activities
1	1	Sun 5-1-2025	Shooting	40 M	Warming up, teaching offensive strategies, small group practice, cooling down.
	2	Thu 9-1-2025	Passing	40 M	Warming up, drills to integrate shooting and passing, small experimental play, feedback, cooling.
2	1	Sun 12-1-2025	Receiving	40 M	Warming up, cooperative exercises with an emphasis on teamwork, cooling.
	2	Thu 16-1-2025	Offensive Skills	40 M	Warming up, identifying and practicing weak skills, using feedback, cooling.
3	1	Sun 19-1-2025	Integrating Skills	40 M	Warm-up, drills to integrate shooting and passing, small experimental game, feedback, cooling.
	2	Thu 23-1-2025	Collaborative Learning	40 M	Warm up, collaborative exercises with a focus on teamwork, cool down.
4	1	Sun 26-1-2025	Optimizing Errors	40 M	Warm up, identify and practice weak skills, use feedback, cool down.
	2	Thu 30-1-2025	Performance Development	40 M	Warm up, customized performance-enhancing exercises, large-scale demo play, cool down
5	1	Sun 2-2-2025	Battling Play	40 M	Warm up, set up a match between players with instant feedback on performance, cool down.
	2	Thu 6-2-2025	Varied Techniques	40 M	Warm up, use different types of learning (distributed practice, learning through play), cool down.
6	1	Sun 9-2-2025	Evaluating Skills	40 M	Warm up, test basic skills (shooting, passing, receiving), provide feedback.
	2	Thu 13-2-2025	Conclusion and Application	40 M	Warm up, use results to improve performance, competitive matches, wrap up the program, cool down.

Session Structure and Time Allocation

Each training session followed a consistent internal structure adapted to the objectives of the specific training week, as shown in table 3. Time was distributed across components that align with motor learning principles, as follows:

Weeks 1–2:

The training material was divided over the two sessions of a week as follows. Each session commenced with approximately 10–15 min of dynamic warm up programmes aimed at stretching and agility. This conclusion was then succeeded by 10–15 minutes of skill-based drills that included immediate knowledge of results, specifically targeted at shooting accuracy. Brief video demonstrations and verbal instructions were incorporated as observational learning elements for approximately 10 minutes in each session. The remainder of time (approximately 5–10 minutes) was used for repetitive skill training (e.g., passing, shooting), and for short instructional breaks. The overall duration of these sessions never exceeded 40 minutes.

Weeks 3–4:

Each session included a 10–15 minutes warm-up, as well as about 15 min of distributed practice on readily-practiced basic skills. Cooperative pair/group learning activities were applied during about 10 min in small groups, competitive mini-games were used for around 5 min and it was finally completed with a small relaxation period.

Weeks 5–6:

The sessions consisted of a warm-up lasting 10–15 minutes and subsequent instructional approaches (feedback-based drills, distributed practice, play-based learning) for 15–20 minutes. 5–10 min for reinforcement of weaker skills, using short activities in game-like environment to promote task transfer; and cooling down time.

The programme was reviewed and accepted by sports training and handball education experts. The referees were judging the content if referring to general scientific and pedagogical factors. Their responses were employed in a revised and expanded training sequence to reinforce both the credibility of the program and its effectiveness in meeting the specified educational and performance objectives.

Table 3. Training plan for beginner handball players based on motor learning techniques

The schedule of training sessions:
Week 1-2
Each session:
Warming up: 15 minutes (flexibility and agility exercises).
Immediate feedback: 20 minutes (shooting drills).
Learning through observation: 20 minutes (videos and description of techniques).
Skill drills: 30 minutes (repetitive passing and shooting practice).
Cooling down: 5 minutes.
Week 3-4
Each session:
Warming up: 15 minutes.
Distributed practice: 25 minutes (various exercises on basic skills).
Cooperative learning: 30 minutes (pairs to practice skills as groups).
Competitive play: 15 minutes (small games).
Cooling down: 5 minutes.
Week 5-6
Each session:
Warming up: 15 minutes.
Implementation of different learning techniques: 45 minutes (alternate between feedback, distributed practice, and learning through play).
Focus on improving weak skills: 20 minutes (spend time practicing the elements that need improvement).
Larger practice games: 10 minutes.
Cooling down: 5 minutes.

Skill Assessment Tool

Rationale for Tool Selection

A specially designed Handball Skills Assessment Scale that had been developed for the purpose of this study was used to assess basic handball skills. Some general and some national talent identification instruments already exist in handball, but focus is purely on testing talented players or having limited focus on the assessment of individual physical or technical elements in competitive players. This study, however, intended to examine learning and applying basic handball skills in the context of teaching among beginners. Consequently, a tool targeted at the stage of development for novices and one that could be guided by motor learning principles was deemed more suitable.

Assessment of performance was made from observed performance during game related structured tasks and skill specific drills. All evaluations were made by the same operator in an individual way to guarantee that all examinations could be compared accurately. The evaluation of the tests was made by handball coaches only, so as to guarantee reliability in judging. The coaches participating in the evaluations were formally licensed as a coach, with at least five years of practical coaching experience from the youth handball sector.

Trained handball referees attended all of the testing sessions along with the head coaches, but served only to oversee that official regulations were adhered to, in order for standardized testing surroundings

and proper procedural maintenance. There were no technical and motor performance variables included, preventing subjectivity or misinterpretation of skill performance from the judges. This well-defined demarcation of duties strengthened the impartiality and scientific standard of assessment.

Expert review was conducted to verify the content validity of the scale, while reliability was assessed by calculating Cronbach's alpha coefficient and found to have a good internal consistency. Taken together, these tests confirm the applicability of this judging instrument for testing basic handball skill acquisition in novices.

A- Scale Description

A special developed Handball Skills Assessment Scale was used for assessing the performance of basic handball skills (table 4). The scale attempts to measure and evaluate objectively based on criteria these seven fundamental skills of the novice beginner (i.e. playing level 1). Each category is graded on a 5-point Likert scale, from 1 (inadequate) to 5 (excellent).

Evaluations were based on the game performance and observed execution of actions, and were tested individually by trained coaches or referees. The information was tabulated, indexed by skill area, and examined to ascertain individual and group training needs.

Feedback was provided throughout the training process, and regular evaluations (e.g., every four weeks) were conducted to monitor progress and guide personalized skill development.

Table 4. Handball Skills Assessment Scale Criteria and Descriptions

No.	Standard	Description	Rating (1 - 5)
1	Shooting	Shooting accuracy and speed of execution.	
2	Passing	Passing accuracy and the player's speed of response when passing.	
3	Receiving	The player's ability to receive the ball effectively.	
4	Movement and positioning	The player's ability to move efficiently and position himself during the game.	
5	Teamwork	The player's ability to work as part of a team and understand game strategies.	
6	Defense	The player's performance in defending the ball and putting pressure on the opponent.	
7	Physical endurance	Physical fitness level and stamina for the duration of the match.	

B. Psychometric properties of the scale

Validity of the scale:

1-Validity of the arbitrators

The scale was evaluated by a panel of professional referees experienced in sports training and sport science to verify the reliability of the handball skills assessment scale. Arbitrators were selected based upon multiple criteria such as practical experience pertinent to handball and academic knowledge in handball. Arbitrators also made comments on each of the measures in the scale, including the clarity of the criteria and questions as well as how well-suited it was for particular measurement goalsOn account of this feedback, as well as some issues raised by reviewers--notably concerning measurability—we revised the scale.

2- Exploratory Validity

In order to ensure the reliability of the exploratory test, a sample of 10 junior hand ball players attended as experimental. While testing, the entire Handball Skills Assessment Scale was applied and player experiences according to each item were recorded. Coaches' and participants' comments reflected the experiment, resulting in; vital information of how well performing the scale is and how easy it is to operate.

It was found through analysis of the results, that players ratings were indeed a true representation of their abilities. This demonstrates that the scale can be used to determine weak points. Based on the feedback, some components of the scale were modified. As a result, we believe validity conducted on the exploratory trial adds toward promoting scale reliability and sensitivity in evaluating handball performance as well an important initial stage in developing a scientifically based training system.

3- Stability of the scale according to Cronbach's alpha

This initial experiment was conducted on a sample of novice players. The scale's Cronbach's Alpha coefficient was used. Coefficients of 0.7 or higher became generally accepted as good, while those above 0.9 indicated excellent stability.

Analyses results indicated that the reliability of Cronbach's alpha coefficient was calculated as 0.85 for handball skills evaluation scale, which was found high reliable and stable. This offers some comfort in the use of such scales as a useful assessment tool. And it also helps the coaches to trust when based on performance in youth tournaments or over periods of time training, they come to conclusions about their players' needs.

Statistical Analysis

This study used means and standard deviations were calculated using SPSS ver.26 software. Cronbach's alpha coefficient was used to measure the stability of the scale, which obtained a value of 0.85, quite satisfactory. In addition, correlation analysis was used to ascertain existence of relationships between performance criteria; t-test to compare differences between two groups. These methods helped create a comprehensive and accurate picture of the player's abilities.

Results

On the motor learning skills scale in the dimensional application, there is a statistically significant difference at the 0.05 level of significance between the mean scores of the experimental sample that received instruction in motor learning techniques and the control sample that received training in the traditional way.

Means and standard deviations were calculated for each group, and then a t-test was applied to the results to determine the presence of statistically significant differences between the means. The results showed that the experimental group achieved a higher mean on skills scale. It also showed there was a significant difference at 0.05 level, which confirms effectiveness to some extent with new technological methods in training, as shown in table 5.

Table 5. Results of the t-test to investigate the difference between the mean scores of the experimental and control groups in the post-application

Group	Number	Mean	S.D.	Degrees of freedom	T-test	P Value	significance
Experimental	30	4.33	2.28	28	2.67	0.001*	sig
Control	30	3.19	1.89				

significant at $p \leq 0.05$

The results indicate that there is a statistically significant difference at the 0.05 level of significance between the mean scores of the responses of the experimental sample that used motor learning techniques and the control sample that received training in the traditional way.

The experimental group, which included 30 players, showed a mean of 4.33 with a standard deviation of 2.28, while the control group with the same number of participants had a mean of 3.19 with a standard deviation of 1.89.

When performing a t-test, we obtained a value of 2.67, which indicates a significant difference between the two groups, and since the significance level (p) is 0.05, which is considered a conventional threshold for determining a significant difference, this means that the difference between the averages of the two groups is real and not the result of chance.

The analyses were performed on basis of global scores extracted from the Handball Skills Assessment Scale, which intended to represent the overall development of basic handball skills rather than single technical factors. While the training included several dimensions of skill (i.e., shooting, passing, receiving, movement behaviour and teamwork related to attack or defense, physical condition), we aimed at looking for collective effects of motor learning–based practice across skill types in beginners.

To reduce the number of multiple statistical comparisons, an analysis of each skill component was not pursued, due to the exploratory nature of this study and sample size. The composite score used contains

a number of parallel tests which is in accordance with the study design to focus on holistic development of skills and mirrors integrated demands at handball performance on real-game conditions.

Discussion

According to the all-encompassing results achieved in the study, it would be possible to conclude that, while experimental group indeed followed high-velocity learning techniques, control group definitely used a traditional and conventional teaching method. This essential difference suggested that, relative to their outdated peers, the learning abilities of those belonging to the experimental group were far better than those measured in the members comprising the control group. A disparity so glaring, can be explained by a few very convincing reasons.

The results are in line with research findings in handball education that have shown how the basic skill performance of beginners can be improved when teaching is conducted according to a motor learning–based instructional approach. Existing studies of youth handball training have shown that structured practice, augmented feedback, and task-orie nted learning environments are all factors on significant development with respect to shooting accuracy, passing efficiency, and overall game perf ormance when compared to traditional training methods (Henigman & Ohnjec, 2022; ÇAKIT et al., 2022; Espoz-Lazo et al., 2023). These simimlarities lend further support to the ideas that motor learning principles are most beneficial in the early phase of mastering handball skills.

In contrast to the present study that investigated learner-centered learning strategies for both groups, techniquefocussed and traditional research may suggest that they would not be as effective in promoting better performances. It has been reported that repetition with low amount of feedback can lead to short-term performance gains, but does not easily transfer into long-term retention and would require new training or a reinstatement of the errorless retrieval strategy (Raiola, 2017; Fasold et al., 2021). Conversely, those that emphasize variable practice, feedback regulation and contextually rich learning—similar to the present study — have been associated with superior adaptability and decision-making in dynamic sport environments (Wulf & Lewthwaite, 2016; Larkin et al., 2022).

Results of the pedagogical quality – The effectiveness of the training in this study is further confirmed by values provided by other team sports using similar pedagogical resources. In football, basketball and volleyball the effect of motor learning–based teaching, cooperative learning and feedback-based practice on skill acquisition (Williams & Hodges, 2005) as well as tactical comprehension and involvement in the game has been underlined among youth (Hassan & Abdulkareem, 2025). These similarities indicate that the effects of motor learning methods in handball are transferable to other team sports with equivalent perceptual–motor and social requirements.

modern means of facilitating interaction raise levels of involvement and involvement by participants in a material way, which fosters an atmosphere of excitement and centrally motivated participation among learners (Abrenica, 2024; Stamps, 1995). Furthermore, the availability of instant and personalised feedback customised for each player's needs help to observe their errors, which enhances gameplay in a more efficient manner (Lauber & Keller, 2014; Pangestoe et al., 2023).

Moreover, the motor learning theory suggests that even simple movements are able to convey messages inherently related to this new learned knowledge and skills through one's continued exercise thus prompting further reflection regarding this newfound sensation and insight. Furthermore, it significantly enhances comprehension of the skill studied (Coker, 2017; Pahrul Rodji et al., 2022).

Besides, these new ways mean that we can actually develop a set of cooperative teamwork skills in players: the group learns jointly to solve problems as a whole that they created together through their own behavior. The overall success of this strategy to positively impact performance at the team level is significantly influenced by the interdynamic behavior between its members (Bucea et al., 2023; Kao, 2019; Hassan & Abdulkareem, 2025).

Lastly, transfer as the focus promotes players to “do” something with their understanding by using the knowledge within the authentic sports and sub-sports context. It is good proof of the practical worthiness and practical implementation of contemporary teaching theories in sports education (Ciubotaru, 2022; Formenti et al., 2021).

In the light of such enlightening conclusions, there is an urgent need to adhere new and participatory teaching strategies in a way that students can participate and practice more which results in remarkable progress in academic performance as well as skill acquisition. These findings suggest these are breakthroughs that are fundamental in improving both the students' learning experience and the promotion of sustainable development in this huge area we call sports education, as a result giving rise to more competent athletes and professionals in the field of sport.

Conclusions

Whether we compare traditional with modern ways, using these mores can increase "pupil interaction" and "active involvement", provide good "learning atmospheres" and realize more yield. In addition, these findings also suggest the importance of instantaneous feedback availability to correct for errors and further practice skills. And then they get to learn math, as they move and engage: this is a great way to develop their abilities at working effectively with others. It suggests the need to incorporate these educational methods in sport education.

Trainers in these sports should be encouraged to integrate motor learning approaches into their training programs to optimise skill acquisition by athletes. This could be realised by implementing workshops and coach education sessions highlighting contemporary teaching strategies such as motor learning and cooperative methods. Practice should also be organized into competitive contexts, which encourage the use of motor skills learned. Additionally, helping coaches and athletes communicate effectively is crucial so that pertinent feedback can be provided on an ongoing basis to accommodate the needs of the athlete and enhance skill development.

Conflict of interest

The authors have not declared any conflict of interest referring to this article.

Disclosure statement

None of the authors was funded for, or has any competing interests with regard to, conducting this study.

Informed Consent

Informed consent was obtained from all participating in this project.

Ethical Approval

Human research was conducted in compliance with the national rules and institutional regulations concerning the ethical use of human subjects and with the Declaration of Helsinki principles, and it has been approved by Baghdad University review board.

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Authors' and translators' details:

Noor Dheyaa Abdulhameed nour.deyaa@uoturath.edu.iq Author/ correspondiente/ Translator