



Improving volleyball forearm-passing learning outcomes through the STAD cooperative learning model: A classroom action research study

Peningkatan hasil belajar passing bawah bola voli melalui model pembelajaran kooperatif STAD: Penelitian tindakan kelas

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ABSTRACT

Background: Low proficiency in volleyball forearm passing and limited active student participation are important challenges in physical education, particularly when opportunities for practice are constrained by limited equipment.

Objective: This study aimed to improve students' volleyball forearm-passing learning outcomes through the implementation of the Student Teams Achievement Division (STAD) cooperative learning model.

Methods: A classroom action research design was employed across two cycles, each consisting of planning, action, observation, and reflection stages. The participants were 36 tenth-grade students, including 14 boys and 22 girls. Instruction was organized into nine heterogeneous groups, while data were collected through observation, a forearm-passing performance test, and documentation. The data were analyzed descriptively using the number and percentage of students who met the mastery criterion.

Results: During the pre-action stage, 11 students (30.56%) achieved mastery. This number increased to 16 students (44.44%) after Cycle I. Following instructional improvements in Cycle II, including the addition of practice aids to increase opportunities for practice, 33 students (91.67%) achieved mastery, exceeding the predetermined classical mastery criterion of 75%.

Conclusion: These findings indicate that the progressive implementation of STAD, accompanied by reflection and instructional modification, was associated with improved volleyball forearm-passing performance. Future research should include comparison groups, larger samples, and measures of skill retention to provide stronger evidence regarding the effectiveness of STAD.

ABSTRAK

Latar belakang: Rendahnya penguasaan keterampilan passing bawah bola voli dan terbatasnya partisipasi aktif siswa menjadi permasalahan dalam pembelajaran pendidikan jasmani, terutama ketika kesempatan berlatih dibatasi oleh ketersediaan peralatan..

Tujuan: Penelitian ini bertujuan untuk meningkatkan hasil belajar passing bawah bola voli melalui penerapan model pembelajaran kooperatif Student Teams Achievement Division (STAD).

Metode: Penelitian menggunakan desain Penelitian Tindakan Kelas yang dilaksanakan dalam dua siklus, masing-masing terdiri atas tahap perencanaan, tindakan, observasi, dan refleksi. Partisipan terdiri atas 36 siswa kelas X, yaitu 14 laki-laki dan 22 perempuan. Pembelajaran dilaksanakan dalam sembilan kelompok heterogen, sedangkan data dikumpulkan melalui observasi, tes unjuk kerja passing bawah, dan dokumentasi. Data dianalisis secara deskriptif menggunakan jumlah dan persentase siswa yang mencapai kriteria ketuntasan.

Hasil: Pada tahap pratindakan, 11 siswa (30,56%) mencapai ketuntasan. Setelah Siklus I, jumlah tersebut meningkat menjadi 16 siswa (44,44%). Setelah perbaikan pembelajaran pada Siklus II, termasuk penambahan alat bantu latihan untuk meningkatkan kesempatan praktik, 33 siswa (91,67%) mencapai ketuntasan, melebihi target klasikal sebesar 75%.

Kesimpulan: Hasil ini menunjukkan bahwa penerapan STAD secara bertahap yang disertai refleksi dan modifikasi pembelajaran berkaitan dengan peningkatan penguasaan passing bawah bola voli. Penelitian selanjutnya perlu menggunakan kelompok

pembandingan, sampel yang lebih luas, dan pengukuran retensi keterampilan untuk menguji efektivitas STAD secara lebih kuat.

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Highlights

- ✓ STAD-based cooperative learning was accompanied by progressive improvement in volleyball forearm-passing outcomes.
- ✓ Mastery increased from 30.56% at pre-action to 44.44% in Cycle I and 91.67% in Cycle II.
- ✓ Reflective instructional modification and increased practice opportunities supported skill improvement.

Introduction

Physical education plays an important role in developing students' motor skills, physical fitness, social competence, and meaningful learning experiences (Ben Rakaa, Bassiri, & Lotfi, 2025). In volleyball instruction, forearm passing is a fundamental skill because it is used to receive serves, control the ball, and initiate subsequent offensive play. However, mastering this skill requires adequate opportunities for practice, feedback, movement repetition, and learning interactions that allow students to participate actively. In Class X12 at SMA Negeri 8 Denpasar, the initial condition showed that only 11 of 36 students (30.56%) met the mastery criterion for forearm passing, whereas 25 students (69.44%) had not yet reached the required standard. Errors were particularly evident in the initial stance, ball contact, and follow-through, while practice opportunities were also limited by the availability of instructional equipment. These conditions indicate the need for a pedagogical strategy that can increase student participation while expanding opportunities to practice the skill.

This issue is important because motor-skill learning is determined not only by teacher demonstrations but also by opportunities to perform movements, receive feedback, observe peers, and correct errors through repeated interaction. Cooperative learning has emerged as a widely used pedagogical model in physical education because it integrates individual accountability with group collaboration (Akil, Tokay, & Güngör, 2024; Kim, & Park, 2024). A systematic review by Bores-García et al. (2021) showed that cooperative learning in physical education has been implemented across different educational levels and is associated with development in motor, cognitive, social, and affective domains. These findings were reinforced by Zhou et al. (2023), whose bibliometric analysis showed that cooperative learning has become an important approach in the development of physical education pedagogy. A recent umbrella review further indicated that the benefits of cooperative learning extend beyond physical learning outcomes to cognitive, social, psychological, and affective dimensions (Armada-Crespo et al., 2026).

A growing body of empirical evidence suggests that cooperative learning may support the acquisition of motor skills. Yang et al. (2021) found that cooperative learning could improve motor-skill learning and learning motivation compared with conventional approaches. Mežan and Škof (2023) similarly reported that cooperative learning provides conditions that support motor learning in children through active participation and peer-assisted learning. In the context of volleyball skills, Akkaya and Mirzeoğlu (2024) found that cooperative learning among secondary school students increased academic learning time as well as knowledge and volleyball skill acquisition. Umar et al. (2023) showed that instructional methods, including peer tutoring, interact with students' motor ability in determining learning outcomes for basic volleyball techniques. These findings

suggest that the structure of student interaction and opportunities for peer-assisted learning may be important components of sport-skill acquisition.

Further evidence also supports the relevance of the characteristics embedded in the Student Teams Achievement Division (STAD) model. Ali and Siong (2023) applied STAD in a badminton learning module for secondary school students and reported improvements in sport-skill mastery. In addition, Luo et al. (2020) showed that cooperative models based on heterogeneous grouping and individual accountability can improve motivation and motor skills in physical education. These mechanisms are relevant to STAD because students learn in heterogeneous groups, receive peer support, remain accountable for their individual learning, and contribute to group achievement (Hu, 2026). In physical education, student interaction is also important because peer observation, assistance, and feedback can support motor-skill acquisition (Escalié et al., 2022). Therefore, STAD provides an appropriate pedagogical foundation for teaching forearm passing, a skill that requires repetition, movement correction, and active participation from all students.

Nevertheless, several gaps can still be identified in the existing literature. First, much of the research on cooperative learning has evaluated model effectiveness using experimental or quasi-experimental designs, whereas evidence documenting how such models are progressively refined through teacher reflection in authentic classroom settings remains more limited. Second, studies of volleyball skills have demonstrated the benefits of cooperative learning and peer tutoring, but relatively few have specifically documented the use of STAD to improve forearm-passing learning outcomes through iterative action-reflection cycles among secondary school students. Third, some previous studies have been conducted under learning conditions with adequate facility support, whereas limited resources may constrain students' opportunities for physical activity and skill practice. Research in resource-constrained schools has shown that the availability of facilities and learning resources represents an important challenge in the delivery of physical education (Kahts-Kramer et al., 2022; Kahts-Kramer & Wood, 2023). Therefore, more practice-based evidence is needed regarding how cooperative learning can be adapted when teachers face limitations in instructional equipment.

The novelty of this study lies in the iterative implementation of STAD through classroom action research to improve volleyball forearm-passing learning outcomes while adapting instruction to equipment constraints. In the first cycle, STAD was implemented through heterogeneous grouping and peer-assisted learning. The reflection results were then used to improve implementation in the second cycle, including expanding practice opportunities through the use of additional training aids. Thus, the study not only examined changes in learning mastery but also documented the planning-action-observation-reflection process used to adapt the pedagogical model to authentic classroom problems. This approach is consistent with the role of action research in physical education as a means of developing and improving teaching practice in context (Madsen et al., 2025; Souza et al., 2025).

Based on these problems and research gaps, this study aimed to improve volleyball forearm-passing learning outcomes through the implementation and progressive refinement of the STAD cooperative learning model among tenth-grade students.

Scientifically, the study is expected to add evidence regarding the application of cooperative learning to motor-skill instruction through a classroom action research design. Practically, the study provides physical education teachers with an example of how heterogeneous grouping, peer tutoring, individual accountability, instructional reflection, and modifications to practice opportunities can be used as strategies to improve volleyball instruction under conditions of limited equipment.

Materials and Methods

Study Design

This study employed a Classroom Action Research (CAR) design aimed at improving the learning process and outcomes of volleyball forearm passing through the implementation of the Student Teams Achievement Division (STAD) cooperative learning model. The study was conducted in two cycles, with each cycle consisting of four stages: planning, action, observation, and reflection. Each subsequent cycle was implemented based on reflections on the learning process and outcomes of the preceding cycle, and the action was discontinued once the predetermined success criteria had been achieved. This action-reflection approach is consistent with the nature of classroom action research, which places the improvement of instructional practice at its core.

The study was conducted at SMA Negeri 8 Denpasar during the second semester of the 2025/2026 academic year. Cycle I was conducted on April 29 and May 6, 2026, whereas Cycle II was conducted on May 13 and May 20, 2026. Thus, each cycle consisted of two sessions, with each session lasting 2 × 45 minutes.

In Cycle I, forearm-passing instruction was implemented using the STAD model through heterogeneous grouping and peer-assisted learning. Reflection on Cycle I indicated that students' opportunities for practice remained limited because the number of available volleyballs was insufficient relative to the number of students. Therefore, instructional improvements were introduced in Cycle II by adding balloons as supplementary practice aids so that more students could practice simultaneously. Accordingly, the changes observed from Cycle I to Cycle II should be interpreted as the result of the overall instructional improvement process rather than as evidence of the isolated effect of a single intervention component.

Participants

The participants were all 36 students in Class X12 at SMA Negeri 8 Denpasar, comprising 14 boys and 22 girls. The class was selected based on preliminary observations indicating low achievement in volleyball forearm-passing skills. All students in the class were included because the classroom action research was specifically intended to address an instructional problem identified within that class.

During the implementation of STAD, the 36 students were divided into nine heterogeneous groups of four students each. Each group consisted of one high-performing student who served as a peer tutor, two students with moderate ability, and one student with lower ability. This group structure was maintained to facilitate cooperation, student interaction, and peer-assisted learning throughout the instructional process.

STAD Implementation procedure

The STAD model was implemented through six main phases: (1) communicating the learning objectives and motivating students, (2) presenting information or demonstrating the skill, (3) forming heterogeneous groups, (4) guiding students as they worked and learned in groups, (5) conducting individual

evaluation, and (6) providing group recognition (Table 1). This cooperative learning structure was used to increase students' opportunities to receive assistance, feedback, and shared learning experiences during skill practice.

During the group-work phase, peer tutors assisted group members in understanding and practicing the components of forearm passing, while the teacher monitored the learning process and provided corrective feedback when necessary. Forearm-passing performance was assessed across three movement components: the initial stance, ball contact, and follow-through.

Instruments and data collection

Data were collected through observation, performance testing, and documentation. Observation was used to record students' activities and participation during the learning process. A performance test was used to assess volleyball forearm-passing skills, while photographs, videos, and student score records were used as supporting documentation for the action process.

The primary learning-outcome instrument was a forearm-passing performance rubric scored on a 1–4 scale across three skill components: the initial stance, ball contact, and follow-through. The scores obtained by each student were then converted to a 0–100 scale using the following formula:

$$\text{Score} = (\text{obtained score} / \text{maximum possible score}) \times 100$$

Statistical analysis

The data were analyzed using descriptive statistics because the purpose of the classroom action research was to describe changes in learning outcomes from the pre-action stage to Cycle I and Cycle II, rather than to test causal relationships using inferential statistics. The analysis included the number of students who achieved mastery, the number who did not achieve mastery, and the percentage of students who met the classical mastery criterion at each stage. The classical mastery percentage was calculated using the following formula:

$$\text{Classical mastery (\%)} = (\text{number of students achieving mastery} / \text{total number of students}) \times 100$$

Students were considered to have achieved mastery if they obtained a KKTP score above 75. The action was considered successful when at least 75% of students achieved classical mastery and learning outcomes improved compared with the previous cycle. These criteria were retained as specified in the original manuscript. The results were then compared descriptively across the three stages: pre-action, Cycle I, and Cycle II. Because inferential statistical tests were not used, changes across stages were reported as descriptive improvements rather than as statistically significant increases.

Results

The results are presented across three assessment stages: the pre-action stage, Cycle I, and Cycle II. The primary indicators were the number of students who met the Learning Objective Achievement Criteria (KKTP) and the percentage of classical mastery.

Pre-action results

At the pre-action stage, 11 of 36 students (30.56%) met the KKTP, whereas 25 students (69.44%) had not yet achieved mastery. Initial observations indicated that students' main difficulties were related to the initial stance and follow-through components of the forearm-passing technique. The classical mastery rate of 30.56% remained below the predetermined success criterion of 75%; therefore, the instructional action proceeded to Cycle I.

Cycle II results

In Cycle II, the number of students who achieved mastery increased to 33 students (91.67%), whereas 3 students (8.33%) had not yet met the KKTP. Compared with Cycle I, the classical mastery rate increased by 47.23 percentage points, from 44.44% to 91.67%. Overall, the increase from the pre-action stage to Cycle II was 61.11 percentage points. Because the classical mastery rate exceeded the predetermined success criterion of 75%, the action cycle was terminated after Cycle II.

Descriptively, the results showed a progressive increase in learning mastery across the three stages of the study. The mastery rate increased from 30.56% at the pre-action stage to 44.44% in Cycle I and then to 91.67% in Cycle II (Table 2). However, because the study relied on descriptive analysis and did not employ inferential statistical testing, these changes should be interpreted as descriptive improvements rather than as statistically significant differences.

Table 1
Implementation of STAD learning across cycles

Stage	Cycle I	Cycle II
Planning	Developing the STAD lesson plan and forming heterogeneous groups	Revising the instructional plan based on reflection from Cycle I
Content presentation	Demonstration of the forearm-passing technique	Reinforcement of the forearm-passing technique
Group work	Nine groups × four students; peer tutoring	The same groups with increased opportunities for practice
Practice equipment	Available volleyballs	Volleyballs plus balloons as supplementary practice aids
Evaluation	Individual performance test	Individual performance test
Reflection	Identifying limited opportunities for practice	Evaluating whether the success criteria were achieved

Table 2
Changes in volleyball forearm-passing mastery across study stages

Stage	Students achieving mastery, n (%)	Students not achieving mastery, n (%)	Change from previous stage
Pre-action	11 (30.56%)	25 (69.44%)	-
Cycle I	16 (44.44%)	20 (55.56%)	+13.88 percentage points
Cycle II	33 (91.67%)	3 (8.33%)	+47.23 percentage points

Discussion

The findings showed a progressive increase in mastery of volleyball forearm passing, from 30.56% at the pre-action stage to 44.44% in Cycle I and 91.67% in Cycle II. This pattern indicates that the implementation of STAD, accompanied by reflection and instructional refinement, was associated with improved forearm-passing skill mastery. However, the improvement observed in Cycle II should be interpreted cautiously because this stage involved not only the continued implementation of STAD but also an instructional modification in the form of additional practice aids designed to increase opportunities for practice.

These findings are consistent with previous research indicating that cooperative learning can support motor-skill development and learning outcomes in physical education (Faozi et al., 2024). Bores-García et al. (2021), through a systematic review, showed that cooperative learning can provide benefits across motor, cognitive, social, and affective domains. Yang et al. (2021) and Zheng, Sun, and Sheng (2026) also reported that cooperative learning supports motor-skill learning and motivation, while Mežan and Škof (2023) found that cooperative learning can create learning conditions that facilitate motor-skill development. In the context of volleyball, Akkaya and Mirzeoglu (2024) showed that cooperative learning can improve volleyball knowledge and skill acquisition, whereas Umar et al. (2023) demonstrated that instructional methods and motor ability contribute to learning outcomes in basic volleyball techniques. The present findings are also consistent with those of Ali and Siong (2023), who showed that STAD can be used to support sport-skill acquisition among secondary school students.

From a pedagogical perspective, the improvement in learning outcomes may be explained by the characteristics of STAD, which organize students into heterogeneous groups, promote individual accountability, and provide opportunities to learn through peer interaction and support (Hovdal et al., 2021). Such interaction may allow students to receive additional

demonstrations, correction, and feedback during practice (Feng et al., 2025). The relationship between social interaction and skill acquisition in physical education has also been discussed by Escalié et al. (2022). In addition, practice opportunities were expanded in Cycle II through the use of supplementary practice aids. Increasing opportunities for students to perform repeated movements simultaneously may, from a pedagogical perspective, support skill acquisition (Silva, Farias, & Mesquita, 2021). Therefore, the changes observed in the present study were likely associated with a combination of students’ adaptation to the STAD structure, peer-tutor support, teacher feedback, and increased opportunities for practice rather than with any single instructional component in isolation (Cano-Cañada, et al., 2026; Khataybeh, Al-Shadiedh, & Khasawneh, 2024; Saha et al., 2026).

Clinical implications

From a practical perspective, the findings suggest that STAD may be considered as one instructional approach for teaching forearm-passing skills in heterogeneous physical education classes. Organizing students into small groups enables them to support one another, while equipment modifications can help maintain practice opportunities when facilities are limited. This is relevant to the findings of Kahts-Kramer et al. (2022) and Kahts-Kramer and Wood (2023), who identified limited resources as a practical challenge in the delivery of physical education. Accordingly, cooperative learning may be combined with adaptations to tasks and equipment based on classroom conditions, although teachers should continue to monitor technical quality and provide individual assessment.

Study limitations

This study has several limitations. First, it involved only one class of 36 students and did not include a comparison group; therefore, changes in learning outcomes cannot be attributed exclusively to STAD. Second, the instructional improvements introduced in Cycle II involved several changes simultaneously, making it impossible to isolate the contribution of each

component. Third, the study included only two action cycles and did not assess long-term skill retention. In addition, information regarding instrument validity and reliability, inter-rater reliability, and quantitative measures of student motivation, participation, and cooperation was not available. Future research should therefore include larger samples, comparison groups, validated instruments, monitoring of implementation fidelity, and retention assessments to provide stronger evidence regarding the use of STAD in physical education skill learning.

Conslusions

Based on the classroom action research findings, the implementation of the Student Teams Achievement Division (STAD) cooperative learning model, accompanied by reflection and instructional refinement, was associated with improved volleyball forearm-passing learning outcomes among tenth-grade students. Learning mastery increased progressively from the pre-action stage to Cycle II and exceeded the predetermined classical mastery criterion by the end of the study. These findings suggest that organizing students into heterogeneous groups, providing peer-tutor support, conducting individual evaluation, and increasing opportunities for practice may represent relevant strategies in physical education instruction.

Nevertheless, the observed improvements cannot be attributed exclusively to STAD because additional instructional modifications were introduced in Cycle II and the study did not include a comparison group. Future research should involve larger samples, comparison groups, validated instruments, and measures of skill retention to strengthen the evidence regarding the effectiveness of STAD in motor-skill learning.

Author contributions

Conceptualization: F.M.D., I.G.N.A.C.P., and I.G.A.A.S.; Methodology: F.M.D., I.G.N.A.C.P., and I.G.A.A.S.; Investigation: F.M.D.; Data curation: F.M.D.; Formal analysis: F.M.D. and I.G.N.A.C.P.; Project administration: F.M.D.; Supervision: I.G.N.A.C.P. and I.G.A.A.S.; Visualization: F.M.D.; Writing – original draft: F.M.D.; Writing – review & editing: F.M.D., I.G.N.A.C.P., and I.G.A.A.S. All authors have read and approved the final version of the manuscript and agree to be accountable for the integrity and accuracy of the work.

Ethical statement

Formal written informed consent from parents or legal guardians was not obtained. The study was conducted with permission from the school as part of classroom-based educational activities. Students were informed about the study procedures, participation in the research component was voluntary, and confidentiality of participant information was maintained.

Informed consent

Written informed consent was obtained from the parents or legal guardians of all participating students prior to data collection. In addition, assent was obtained from the students. Participation was voluntary, and participants were informed that they could withdraw from the research at any time without penalty.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this manuscript, the authors used ChatGPT (OpenAI) solely to improve language, grammar, and readability. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the accuracy, integrity, and content of the publication.

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Conflicts of interest

The authors declare no conflicts of interest.

Data availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request, subject to appropriate ethical and privacy considerations.

References

- Akkaya, E. E., & Mirzeoğlu, A. D. (2024). The effect of cooperative learning model on academic learning time and acquiring volleyball knowledge and skills. *Eğitim ve Bilim*, 49(220), 83–108. <https://doi.org/10.15390/EB.2024.13111>
- Akil, M., Tokay, B., & Güngör, M. G. (2024). Cognitive health outcomes of fundamental motor skill applications in children through cooperative learning method. *BMC Psychology*, 12(1), 522. <https://doi.org/10.1186/s40359-024-02006-y>
- Ali, S. K. B. S., & Siong, N. U. (2023). Effectiveness of a comprehensive module in improving serving skills and lob shots during badminton training. *Journal of Physical Education and Sport*, 23(5), 1130–1141. <https://doi.org/10.7752/jpes.2023.05141>
- Armada-Crespo, J. M., Caracuel-Cáliz, R. F., & Abad-Robles, M. T. (2026). Cooperative learning in physical education: A systematic umbrella review. *Quest*, 1-17. <https://doi.org/10.1080/00336297.2026.2711726>
- Ben Rakaa, O., Bassiri, M., & Lotfi, S. (2025). Adapted pedagogical strategies in inclusive physical education for students with special educational needs: A systematic review. *Pedagogy of Physical Culture and Sports*, 29(2), 67–85. <https://doi.org/10.15561/26649837.2025.0201>
- Bores-García, D., Hortigüela-Alcalá, D., Fernandez-Rio, F. J., González-Calvo, G., & Barba-Martín, R. (2021). Research on cooperative learning in physical education: Systematic review of the last five years. *Research Quarterly for Exercise and Sport*, 92(1), 146–155. <https://doi.org/10.1080/02701367.2020.1719276>
- Cano-Cañada, E., Tapia-Serrano, M. Á., Saiz-González, P., Fernandez-Rio, J., & Iglesias, D. (2026). Effect of pedagogical models on novelty satisfaction in physical education: A systematic review and meta-analysis. *European Physical Education Review*, 32(3), 656–674. <https://doi.org/10.1177/1356336X251385414>
- Escalié, G., Legrain, P., & Lafont, L. (2022). Relationships between social interactions and acquisitions: Do mixed methods provide added value in physical education contexts? *Physical Education and Sport Pedagogy*, 27(2), 144–155. <https://doi.org/10.1080/17408989.2021.1999914>
- Faozi, F., Dlis, F., Samsudin, S., Hambali, S., & Riyadi, D. N. (2024). Cooperative learning vs direct teaching in basketball: Effects on junior high school students' basic techniques. *International Journal of Disabilities Sports and Health Sciences*, 7, 132–140. <https://doi.org/10.33438/ijdshts.1371249>
- Feng, D., Cossich, V. R. A., Abdelrasoul, E., Campelo, A. M., & Katz, L. (2025). The impact of video performance technology and peer-to-peer learning on table tennis skill acquisition in elementary students. *Frontiers in Sports and Active Living*, 7, 1653334. <https://doi.org/10.3389/fspor.2025.1653334>

- Hovdal, D. O. G., Haugen, T., Larsen, I. B., & Johansen, B. T. (2021). Students' experiences and learning of social inclusion in team activities in physical education. *European Physical Education Review*, 27, 889-907. <https://doi.org/10.1177/1356336X211002855>
- Hu, Y. (2026). Do socio-emotional learning and cooperative learning impact academic self-efficacy in physical education? The mediating role of emotional intelligence. *SAGE Open*, 16(3), 21582440261487872. <https://doi.org/10.1177/21582440261487872>
- Kahts-Kramer, S. A., Du Randt, R., & Wood, L. (2022). Foundation phase teachers' experiences of physical education in low-resource schools: Implications for continuing professional development. *South African Journal for Research in Sport, Physical Education and Recreation*, 44(2), 29-52. <https://doi.org/10.36386/sajrsper.v44i2.207>
- Kahts-Kramer, S. A., & Wood, L. (2023). Guidelines for action learning as professional development to transform physical education in low resourced primary schools in South Africa. *Action Learning: Research and Practice*, 20(2), 100-115. <https://doi.org/10.1080/14767333.2023.2211936>
- Khataybeh, A., Al-Shadiedh, M., & Khasawneh, G. (2024). The effectiveness of cooperative learning strategy for mastery in enhancing the skill performance of some gymnastics floor movements. *Pedagogy of Physical Culture and Sports*, 28(4), 292-300. <https://doi.org/10.15561/26649837.2024.0406>
- Kim, M., & Park, S. (2024). Better together: Promoting cooperative learning in physical education. *Strategies*, 37(2), 38-40. <https://doi.org/10.1080/08924562.2024.2304177>
- Luo, Y.-J., Lin, M.-L., Hsu, C.-H., Liao, C.-C., & Kao, C.-C. (2020). The effects of team-game-tournaments application towards learning motivation and motor skills in college physical education. *Sustainability*, 12(15), 6147. <https://doi.org/10.3390/su12156147>
- Madsen, K. L., Svendsen, A. M., Volshøj, E. S., Jakobsen, A. W., & Lillelund, K. B. (2025). Six teaching strategies to support meaningful PE experiences in early primary schools—results from an action research project. *Physical Education and Sport Pedagogy*, 1-13. <https://doi.org/10.1080/17408989.2025.2489165>
- Mežan, L. Ž., & Škof, B. (2023). Cooperative learning vs. direct instruction in youth sport: Effects on children's motor learning. *Kinesiology Slovenica*, 29(2), 136-156. <https://doi.org/10.52165/kinsi.29.2.136-156>
- Saha, S., İlbağ, İ., Abdi, E., Deutsch, J., Katanić, B., Choudhary, S., Choudhary, P. K., Souza, L. N. D., Silva Júnior, R. R. D., & Tornóczy, G. J. (2026). How do students learn to move? A systematic review of collaborative and game-based pedagogies in physical education. *Frontiers in Sports and Active Living*, 8, 1830716. <https://doi.org/10.3389/fspor.2026.1830716>
- Silva, R., Farias, C., & Mesquita, I. (2021). Challenges faced by preservice and novice teachers in implementing student-centred models: A systematic review. *European Physical Education Review*, 27(4), 798-816. <https://doi.org/10.1177/1356336X21995216>
- Souza, R. V. O. D., de Souza, M. T., Corsino, L. N., da Conceição, W. L., Ulasowicz, C., Venâncio, L., & Sanches Neto, L. (2025). Physical education curriculum systematizing based on action research: A collaborative network between teacher-researchers from public schools in Quixadá—Ceará, Brazil. *Frontiers in Sports and Active Living*, 7, 1373271. <https://doi.org/10.3389/fspor.2025.1373271>
- Umar, Alnedral, Ihsan, N., Mario, D. T., & Mardesia, P. (2023). The effect of learning methods and motor skills on the learning outcomes of basic techniques in volleyball. *Journal of Physical Education and Sport*, 23(9), 2453-2460. <https://doi.org/10.7752/jpes.2023.09282>
- Yang, C., Chen, R., Chen, X., & Lu, K.-H. (2021). The efficiency of cooperative learning in physical education on the learning of action skills and learning motivation. *Frontiers in Psychology*, 12, 717528. <https://doi.org/10.3389/fpsyg.2021.717528>
- Zheng, H., Sun, S., & Sheng, H. (2026). Research on the tracking effect of cooperative learning-based physical education teaching on college students' intrinsic motivation and psychological resilience. *Frontiers in Psychology*, 17, 1806429. <https://doi.org/10.3389/fpsyg.2026.1806429>
- Zhou, T., Wang, H., & Li, D. (2023). Focusing on the value of cooperative learning in physical education: A bibliometric analysis. *Frontiers in Psychology*, 14, 1300986. <https://doi.org/10.3389/fpsyg.2023.1300986>