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Trends in pedagogical approaches to the acquisition of specific movement skills: a systematic review

Zarizi Ab Rahman[1], Muhammad Sultan Almalik[2]
[1]Faculty of Education, Universiti Teknologi MARA, Level 5, 7, FSK 1, 5, Puncak Alam Campus, 42300 Puncak Alam, Selangor Darul Ehsan, Malaysia
[2]Magister Pendidikan Jasmani, Universitas Lambung Mangkurat, Banjarmasin, Indonesia
Email: zarizi@uitm.edu.my[1], 2520129310004@mhs.ulm.ac.id[2]

ABSTRACT

Learning specific motor skills faces significant challenges due to differing goal orientations between school physical education and club performance coaching, resulting in varied efficacy of instructional methods. Therefore, this study aims to systematically identify, evaluate, and compare trends in the most effective pedagogical approaches for facilitating specific motor skill acquisition between physical education teachers and sports coaches. Following the PRISMA 2020 guidelines, this systematic review evaluated 116 primary empirical articles (2017-2026) from six major databases. Data were analyzed thematically based on study characteristics, interventions, and motor skill outcomes. The empirical synthesis reveals distinct pedagogical tendencies with substantial overlap. In schools, teachers predominantly utilize Classroom Action Research relying on cognitive-social approaches to resolve classical movement failures. Conversely, club coaches rely on controlled experiments through repetition manipulation and tactical simulations to precisely automate athletes' discrete muscle memory. In conclusion, motor skill pedagogy effectiveness depends on objective calibration, prioritizing socio-academic participation in schools versus competitive mechanical accuracy in clubs. These findings provide educators and coaches with evidence-based insights to select targeted interventions.

Key words: Sports pedagogy; specific motor skills; physical education teachers; sports coaches.

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Correspondence Address:

Zarizi Ab Rahman
Faculty of Education, Universiti Teknologi MARA, Level 5, 7, FSK 1, 5, Puncak Alam Campus, 42300 Puncak Alam, Selangor Darul Ehsan, Malaysia

INTRODUCTION

Physical education and sports coaching are an integral part of the education system that aims to develop the physical, mental, and movement skills of individuals (Aliriad et al., 2025; Da'i & Apriyanto, 2025; Ghofur et al., 2025; Hakim et al., 2026; Yoda et al., 2025). Mastery of specific movement skills is the main foundation for a person to be able to actively participate in physical activities throughout life or achieve peak achievement in competitive sports (Setiawan et al., 2025; Utamayasa et al., 2025; Wang & Zhou, 2024). In its implementation, both teachers in schools and coaches in clubs are faced with the crucial responsibility of facilitating the acquisition of motion effectively and efficiently through targeted methods. In reality, the success of motor acquisition is highly dependent on how an exercise program is organized, so that a deep understanding of the variety of pedagogical approaches is an absolute

competency that every sports practitioner must master (Masrun et al., 2025; Mudian, 2018; Yhusril et al., 2022).

Although the end goal is intersecting, facilitating the mastery of movement skills is not simple, where in practice in the field there are often motivational and environmental constraints that cause a high rate of movement failure. Mistakes in choosing an instructional approach can result in subjects losing enthusiasm to the point of failing to properly automate basic techniques. In the school environment, physical education teachers are generally faced with crowded classrooms, heterogeneity of students' physical abilities, and curriculum limitations. To overcome this, teachers tend to adopt the Mosston Teaching Style Spectrum to ensure classical learning completeness, where inclusive teaching styles, reciprocal styles, and command styles are often relied on to bridge individual differences without eliminating the essence of movement mechanics (Nasution & Tarigan, 2021; Tangkua, 2017; Telap et al., 2025). Other approaches such as *self-check* and *guided discovery* have also been proven to be able to provide freedom of exploration that increases students' confidence (Kamaruddin et al., 2024; Yudho et al., 2022).

In addition to relying on a spectrum of teaching styles, teachers in schools also turn to cognitive and social models such as Problem-Based Learning (PBL) and peer-tutoring approaches to encourage collaboration between students in solving movement coordination problems (Narullah et al., 2025; Erfayliana & Kusumawati, 2025; Siswanto et al., 2022). Other approaches that are intensively implemented to accelerate the understanding of students' movements that are still in the early cognitive stage are *game-based learning* methods and Teaching Games for Understanding (TGfU) (Daya et al., 2026; Khataybeh, 2024). To enrich instructional innovation, the integration of traditional games and local wisdom is even recognized as crucial in bridging student boredom while stimulating motor participation. Various literature also proves that teachers often adapt through modification of assistive devices, game circuits, educational gymnastics, and the integration of technological and audiovisual media to reduce the margin of failure of early childhood students (Alali et al., 2026; Hamzah & Roesdiyanto, 2022; Rohmah et al., 2024).

In contrast to the school environment centered on participation and cognitive adaptation, the coaching environment in the club is highly demanding of mechanical performance and specialization. In this realm, sports coaches focus their interventions on direct and intensive instruction approaches, where the use of the Drill method becomes the main instrument to lock in technical precision (Ruslan et al., 2025). In order to pursue the automation of *athletes' muscle memory* in discrete motion skills, coaches absolutely rely on the manipulation of the repetition of training loads through the massed practice approach and the breakdown of movement units through the part method (Neldi

et al., 2025; Wang & Zhou, 2024). In addition to the technique isolation method, the coach also prioritizes tactical simulation approaches, modify competition rules, multilateral exercises, and the use of real-time technology to accelerate the accuracy of athletes' execution under the pressure of time and match space (Bartolo et al., 2024; Evans, 2025).

A review of previous research shows that the exploration of the literature on motor learning methods is still fragmented and has a scientific gap (Oktavianus et al., 2025; Perdima et al., 2023). Most literature or systematic reviews highlight only one single variable, such as fundamental movement skills (FMS) in general, or evaluate the curriculum model partially without clashing it with field methods. However, this review explicitly focuses on 'specific motor skills' because they require a higher degree of coordination, mechanical accuracy, and tactical application compared to basic FMS. Furthermore, it is crucial to explicitly justify the significance of comparing school and club contexts; schools prioritize socio-academic participation and holistic development, whereas clubs emphasize competitive mechanical accuracy. Empirical studies on the efficacy of instructional methods on motor mastery have indeed been abundant. However, there has not been a comprehensive systematic literature review that specifically dissects, decomposes, and compares the pedagogical tendencies between physical education teachers in formal schools and coaches in the club arena. Contemporary evidence suggests substantial overlaps between educational and coaching settings, where teachers may employ direct instruction and drill-based methods, while coaches increasingly adopt game-based and athlete-centered approaches. Therefore, analyzing these differing pedagogical tendencies provides rational justification (novelty) in this study.

The purpose of this Systematic Literature Review (SLR) is to identify, evaluate, and synthesize the trends of the most dominant pedagogical approaches and have proven to be effective in facilitating the mastery of specific movement skills. This study maps the primary literature to unravel confusion regarding what is the most rational method to adapt to reduce failure to learn movement based on the demands of the environment (social participation in school versus competitive mechanical accuracy in clubs). Through this comparison, the synthesis findings are expected to be able to equip educators and sports practitioners with evidence-based insights into making professional decisions that are in line with the complexity of the taxonomy of human motion.

METHOD

This study was designed using the Systematic Literature Review method by adapting the guidelines of Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020. Database searches and literature collection were conducted online on six major databases, namely Scopus, Google Scholar, DOAJ,

PubMed, OpenAlex, and Taylor & Francis. To ensure a comprehensive and replicable search, specific keyword combinations, truncations, and Boolean operators (AND, OR, NOT) were applied. The exact search string utilized across the databases was: ("physical education" OR "sports coaching" OR "physical educator*"OR coach*) AND ("teaching method*" OR "pedagogical model*" OR "instructional approach*"OR "teaching style*") AND ("motor skill*"OR "motor learning" OR "skill acquisition" OR "discrete skill*" OR "serial skill*" OR "continuous skill*") AND NOT (rehabilitation OR clinical OR physiotherapy OR hypertrophy OR VO_2 max OR "endurance"). The search parameters were strictly filtered to include only peer-reviewed empirical articles published in English and Indonesian within the last 10 years (2017–2026).

The entire process of searching, filtering, and compiling the data was carried out during the research preparation period to identify and map the pedagogical trends of movement skills comprehensively. The tracing strategy was formulated using the PICO (Population, Intervention, Comparison, Outcome) framework, the feasibility details of which are presented in Table 1.

Table 1. PICO eligibility framework

PICO Elements	Search Criteria
Population (P)	Students in the school environment and individuals/athletes in the coaching environment who are being facilitated to master specific movement skills (discrete, serial, continuous).
Intervention (I)	The application of pedagogical methods or teaching approaches (models/methods/styles) of movement skills by physical education teachers in schools.
Comparison (C)	The application of instructional methods or training approaches (models/methods/styles) of movement skills by coaches in *a sports coaching* setting.
Outcome (O)	Identify global trends regarding the most frequently used teaching and training methods to improve the mastery of pure movement skills (not physical improvement).

To narrow the search results to avoid bias, the researcher set strict inclusion and exclusion criteria. These screening parameters ensure that the selected literature is empirical evidence that truly examines pedagogical interventions on movement mastery. The details of these criteria are outlined in the Table 2.

Table 2. Literature inclusion and exclusion criteria

Type	Criteria Inclusion	Exclusion Criteria
Article Type	Articles resulting from empirical research (Scientific Journals that have been reviewed from national, international, and reputable databases).	Research reports (thesis, thesis, dissertation), *book* chapters, opinion articles, or simply *reviews* without primary data.
Language	English & Bahasa Indonesia.	In addition to Indonesian and English.

Type	Criteria Inclusion	Exclusion Criteria
Participants	Physical education teachers, sports coaches, elementary to secondary school students, and sports practitioners/athletes.	Medical/physiotherapy rehabilitation patients or subjects who focus on improving clinical posture.
Year of Publication	last 10 years (2017 – 2026).	Beyond the limits of the last 10-year time span.
Research Variables	Teaching methods/approaches, instructional training methods, and mastery of motion taxonomy (discrete, serial, continuous).	A method that focuses on training pure physical condition (muscle hypertrophy, *cardiovascular endurance*, or *strength conditioning*).
Scope Bahasan	The context of physical education in schools (*school setting*) and sports coaching (*coaching setting*) globally.	E-sports, industrial ergonomics, or recreational movement activities without the goal of mastering specific motor skills.
Outcome	A trend map of the methods used worldwide and evidence of their effectiveness on the mastery of specific movement skills.	There were no outputs related to the mastery of movement skills (only measuring weight loss or physiological parameters such as VO2Max).

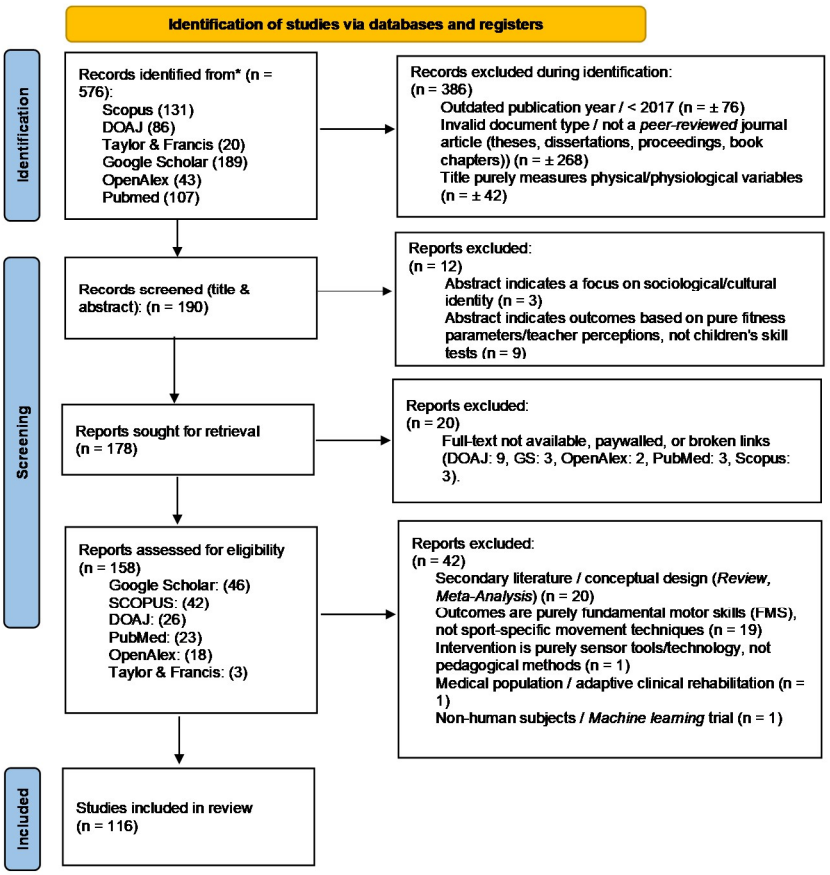

Figure 1. Diagram PRISMA

Based on the PRISMA flowchart (Figure 1), an initial literature search of six major databases (Scopus, Google Scholar, PubMed, DOAJ, OpenAlex, and Taylor & Francis) identified 576 articles. The initial identification stage automatically excludes 386 documents because they were issued outside of the last 10-year time frame, invalid document types, or purely measure only physical variables. Furthermore, the screening of feasibility based on titles and abstracts of the remaining 190 manuscripts eliminated 12 articles that did not contain intervention on the mastery of movement skills, leaving 178 articles. Of these, 20 manuscripts could not be accessed in their entirety, so the full eligibility test was only carried out on 158 articles. This complete manuscript test excluded 42 articles on criteria grounds (in the form of secondary literature, pure FMS testing, or subject/tool incompatibility), and resulted in 116 primary empirical articles that were declared valid and eligible for inclusion. Finally, data from the 116 primary studies were extracted and analyzed using comparative thematic synthesis techniques to dissect the differences in pedagogical approaches between the school environment and coaching, and were evaluated in a descriptive narrative manner based on the percentage of proportion or magnitude of the effect.

Following the final selection of the 116 eligible articles, a systematic data extraction and thematic categorization process was conducted. To ensure the reliability and consistency of the review process, a double-blind coding procedure was implemented. Two independent reviewers extracted the data using a standardized charting form, identifying key elements such as participant characteristics, applied pedagogical interventions (e.g., Mosston's Spectrum, cognitive-social approaches, tactical models), and specific motor skill outcomes.

The extracted data were then systematically coded into broad thematic categories to contrast the instructional tendencies between physical education and sports coaching contexts. Any discrepancies or disagreements between the two primary reviewers regarding data extraction or thematic classification were resolved through thorough discussion. When consensus could not be reached, a third independent reviewer was consulted for final adjudication. This rigorous inter-rater agreement process ensured that the final synthesized data, structured in the thematic tables, accurately and objectively reflected the primary literature without subjective bias.

RESULTS AND DISCUSSION

Thematic Synthesis of Interventions based on Motion Taxonomy

The following is a crosstabs matrix detailing the frequency and percentage of each intervention model/method based on the type of movement skills (Discrete, Serial, Continuous) for each environment (Physical Education Teacher and Sports Coach).

Table 3. A cross-tabulation matrix of a pedagogical approach based on a specific motion taxonomy

Cluster	Teacher			Total (n=76)	Trainer			Total (n=40)
	Discrity	Serial	Continuum		Discrity	Serial	Continuum	
1. Mosston Spectrum (Command, Discount, Inclusion, etc.)	11 (14.5%)	0 (0.0%)	11 (14.5%)	22 (28.9%)	0 (0.0%)	5 (12,5%)	0 (0,0%)	5 (12.5%)
2. Kooperatif & Kognitif (STAD, PBL, Peer-Tutoring)	0 (0.0%)	28 (36.8%)	0 (0.0%)	28 (36.8%)	0 (0.0%)	3 (7.5%)	0 (0.0%)	3 (7.5%)
3. Modification of Tools & Play Environment	15 (19.7%)	0 (0.0%)	0 (0.0%)	15 (19.7%)	4 (10.0%)	0 (0.0%)	0 (0.0%)	4 (10.0%)
4. Practice Scheduling (Massed, Distributed, Part)	4 (5.3%)	0 (0.0%)	0 (0.0%)	4 (5.3%)	12 (30,0%)	0 (0.0%)	0 (0.0%)	12 (30.0%)
5. Tack, Technical & Drill Approach (TGfU, Rondo, etc.)	0 (0.0%)	2 (2.6%)	5 (6.6%)	7 (9.2%)	12 (30.0%)	4 (10.0%)	0 (0.0%)	16 (40.0%)
Overall Totals	30 (39.5%)	30 (39.5%)	16 (21.0%)	76 (100%)	28 (70.0%)	12 (30.0%)	0 (0.0%)	40 (100%)

Based on the cross-tabulation matrix, it can be seen that Physical Education teachers in the school environment have a more diverse and even distribution of the application of pedagogical approaches across the classification of motion taxonomy. Of the 76 literatures, the majority of teachers most often used the Cooperative & Cognitive approach (36.8%) which was exclusively applied to serial motion, and the Mosston Spectrum approach (28.9%) which was used in a balanced manner for discrete and continuous motion. In addition, the Tool Modification & Play Environment approach (19.7%) also dominates especially in the realm of discrete motion. This indicates that the approach in the school environment is more holistic and student-centered, in order to comprehensively accommodate all three spectrums.

In contrast, the trends shown by sports coaches in the club environment (40 literature) show a very specific and concentrated concentration on discrete motion (70.0%), with the absence of application to continuous motion (0.0%). Sports coaches rely heavily on methods oriented towards technical reps and performance resilience, namely the Tactical, Technical & Drill Approach (40.0%) and the Practice Scheduling (30.0%) strategy, which are mostly focused on maturing discrete movements. This contrast clearly shows the difference in orientation between the two environments: PJOK teachers place more emphasis on varied educational-cognitive approaches, while trainers focus more on technical specialization and intensive drills for tactical efficiency and rapid movement (discrete).

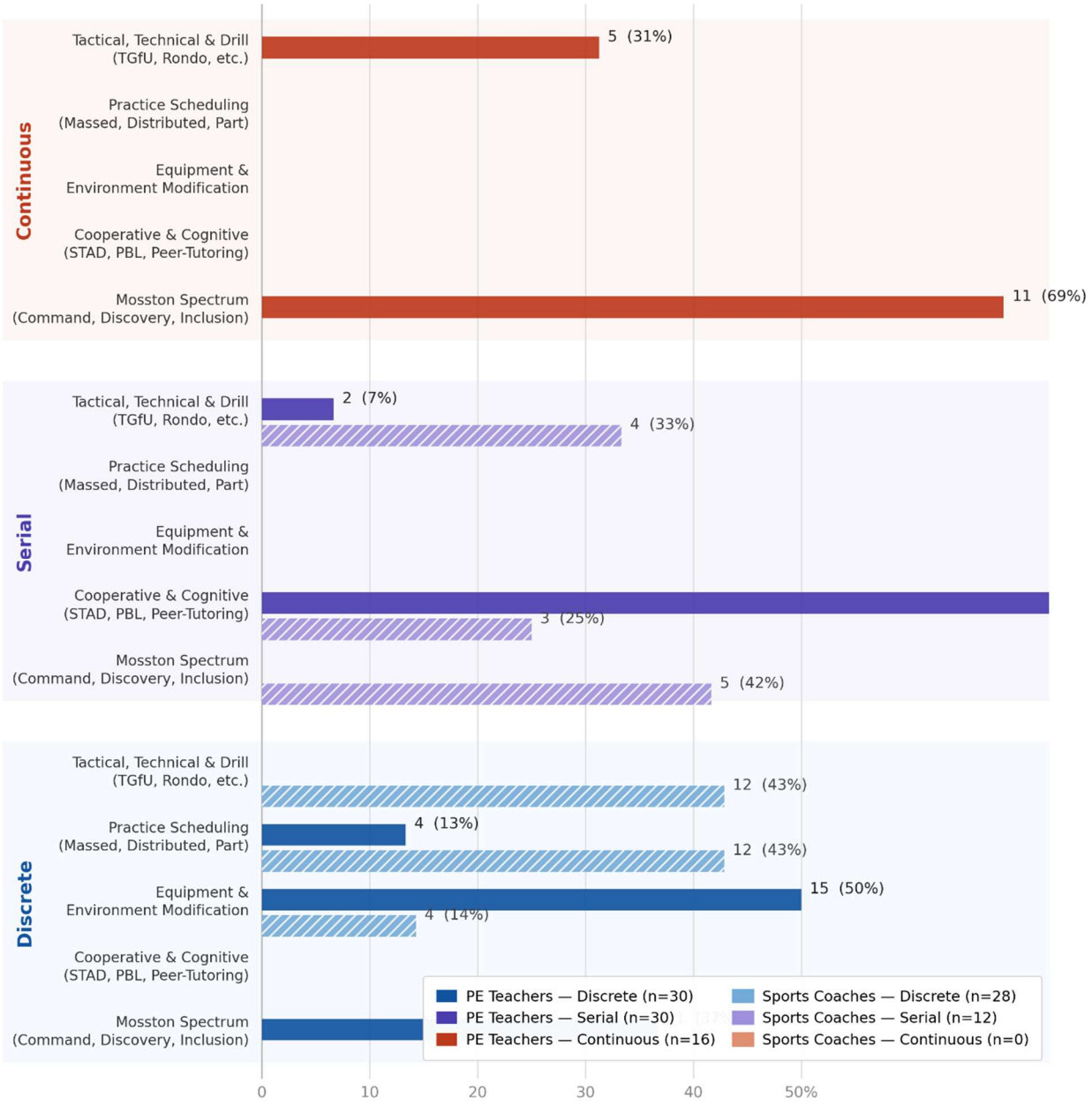

Figure 1. Proportion of methods/models in each motor classification

Sintesis Thematic

Based on data extraction from 116 included studies, instructional approaches in facilitating the mastery of specific movement skills can be classified into four broad themes. These themes reflect the paradigm differences and ultimate goals between the formal education environment (school) and the achievement development environment (club/extracurricular). A summary of the thematic synthesis is presented in Table 4.

6

Table 4. Thematic synthesis of intervention of physical education teachers and sports coaches

Theme Findings	Number of Articles	Summary of Findings	General Implications
Mosston's Spectrum of Teaching Styles & Cognitive/Social Approaches	53 studies	Very dominated by Penjas teachers (50 articles). Using command, reciprocal, discovery, *and Problem-Based Learning* (PBL) and *peer-tutoring*. The main focus is not only on pure movement, but also facilitating problem-solving and social interaction between students.	It is the most frequently adopted approach to facilitate movement skills in a school environment that manages a dense number of students per class.
Practice *Scheduling* & *Drill*	30 studies	Strongly dominated by Sports Coaches (22 articles). It relies on *Massed Practice*, *Distributed Practice*, and *Part Method*. This method trains the units of motion repeatedly until they are automated before being combined into a whole motion.	It is crucial and effective to accelerate the acquisition of high-level *discrete* motion skills (such as *passing* or *shooting* the ball) to build muscle *memory* of athletes.
Tactical and Contextual Approach (*Game-Based*)	17 studies	More adapted by Coach (13 articles). Using the *Teaching Games for Understanding* (TGfU) approach and the *Rondo* Model to place the subject in a real-life game simulation situation.	Produces the highest motion accuracy *gain* as subjects are forced to make kinesthetic decisions quickly under the pressure of space and time.
Modification of Tools, Media, and Play Environment	16 studies	Dominantly carried out by Penjas teachers in elementary schools (14 articles). Integrating the concept of *Teaching at the Right Level* (TaRL), traditional games, and modification of facilities/tools.	It is the best solution to overcome boredom, limited standard school facilities, and reduce the number of "motion failure" in early childhood students.

The synthesis in Table 4 confirms the existence of a firm methodological polarization. In the first and fourth themes, it can be seen that Physical Education Teachers tend to choose methods that are adaptive to the limitations of facilities and the diversity of students' skills, so they modify a lot of tools and rely on cognitive-cooperative approaches (such as PBL or Think Pair Share). In contrast, in the second and third themes, the Sports Coach specifically focused the intervention on the Drill method, Massed Practice, and tactical approach. The coach focuses purely on optimizing the movement mechanics and consistency of athletes' performance under competitive pressure, as evidenced by the high increase in accuracy (gain score) post-intervention.

Synthesis of Similarities and Differences of Findings

Based on the synthesis of 116 included studies, a number of methodological patterns and intervention characteristics were identified that were in line between the formal education environment (school) and coaching (sports clubs). Specifically, the two environments show consistency in the use of media modification and technology integration such as audiovisual video, real-time motion sensors, and digital comics as instruments to accelerate the subject's visual understanding of the correct motion mechanics (Caniuqueo-Vargas, 2023; Da'i & Apriyanto, 2025; Irawan, 2025). In addition, there is a shift in the instructional paradigm where both teachers and trainers begin to reduce the teacher-centered approach, shifting to positioning themselves as facilitators who provide space for exploration through self-check and discovery learning teaching styles (Erdilanita & Purwadi, 2022; Yudho et al., 2022). This similarity is also reinforced by findings related to cognitive engagement; interventions that require problem-solving skills and conceptual/tactical understanding such as in the application of Problem-Based Learning (PBL) and Teaching Games for Understanding (TGfU) have been consistently proven to be able to stimulate intrinsic motivation and active participation of subjects in both environments (Oktavianus et al., 2025; Syaputra et al., 2023).

Despite having a number of convergences of approaches, this systematic review revealed sharp divergences regarding design characteristics, choice of instructional methods, and goal focus between physical education teachers and sports coaches. In terms of study design, research in the school environment is dominated by cyclical Classroom Action Research (PTK) which is oriented towards improving the learning process and classical completeness (Ghofur et al., 2025; Ibura et al., 2025), while coaching studies were very rigid in adopting experimental designs (quasi-or pure) to evaluate the significance of performance spikes (gain scores) between control and treatment groups (Malau et al., 2022; Yhusril et al., 2022). These differences in research frameworks have direct implications for the execution of methods; teachers tend to prioritize Mosston Spectrum (such as inclusion styles) and modification of play areas to accommodate student ratio density and facility limitations (Djohar et al., 2025), inversely proportional to coaches who focus interventions on rep manipulation through practice scheduling (e.g. massed practice) and intensive drill methods to lock in the automation of athletes' muscle memory (Mudian, 2018; Ruslan et al., 2025). In terms of movement taxonomy, the focus of interventions in schools covers a much more varied spectrum, encapsulating serial movements (such as a series of floor gymnastics) and basic locomotor (Nasution et al., 2024; Siswanto et al., 2022), which is in stark contrast to the coach's absolute orientation to the precision mechanics of specific discrete movement skills, such as shooting, passing, or quick serve accuracy (Irawan, 2025).

Table 5. Synthesis of similarities and differences in findings characteristics

Evaluation Aspects	Consistent Characteristics (Equations)	Different Characteristics (Divergence)	Explanation of Divergence based on Literature
Research Design & Evaluation	Use *of Pre-test* and *Post-test* to measure initial and final skills.	Schools: Dominant use of cyclical PTK (Ghofur et al., 2025). Clubs: Dominant using Experiments with Control Groups (Malau et al., 2022).	Teachers are tied to the administration of the entire classroom curriculum, while coaches are free *to randomize* athletes for experiments.
Pedagogical Approach	Utilization of media/technology; Instructor as a facilitator (Da'i & Apriyanto, 2025).	Teachers: Mosston Spectrum Focus, Play, & Cooperative Style (Djohar et al., 2025). Trainer: Focus on Mass Repetition (*Massed/Distributed*) & Tactical (Ruslan et al., 2025).	The goal in school is active participation in order to achieve classical completeness; The goal at the club is technical automation and competitive performance.
Focus on Taxonomy of Motion	Trying to eliminate the failure of the subject's motion mechanics.	Teacher: Very varied movement (Serial, Locomotor, Manipulative) (Nasution et al., 2024). Trainer: Focused on fast-paced discrete motion (Irawan, 2025).	The demands of dual competency mastery in school (a variety of sports) vs. absolute accuracy specialization on one specific sport in the club.

Addressing the research question regarding the instructional methods, this systematic review indicates that there are distinct pedagogical tendencies between the school environment and sports coaching. Rather than proving absolute effectiveness as this review primarily synthesizes implementation frequencies the data reflects how contextual factors and instructional constraints dictate pedagogical choices. In the formal education environment, Physical Education Teachers are faced with the heterogeneity of students' abilities, high class ratios, and broad curriculum demands. To address these challenges, teachers predominantly utilize approaches that facilitate cognitive problem-solving and social interaction, particularly through the application of the Mosston Teaching Style Spectrum, Problem-Based Learning (PBL), as well as the modification of traditional tools and games (Da'i & Apriyanto, 2025; Ghofur et al., 2025; Nasution & Tarigan, 2021). This approach is highly favored and recommended because it accommodates inclusive participation and classically

reduces the rate of "motion failure" while maintaining students' intrinsic motivation

In contrast, the instructional pattern applied by Sports Coaches in a club/extracurricular environment is heavily oriented towards improving mechanical performance and automating muscle memory for specific discrete movement skills. Therefore, coaches frequently employ methods that manipulate the repetition load and reduce the limitations of athletes' space-time, relying heavily on Practice Scheduling (such as Massed Practice and Part Method) as well as tactical simulations such as Drill and Rondo Model (Mudian, 2018; Ruslan et al., 2025). These methods dominate the coaching setting because the primary learning objective is competitive mechanical accuracy rather than broad socio-academic development. Overall, although both environments exhibit similarities in integrating visual media technology and positioning the instructor as a facilitator, these distinct pedagogical choices emphasize that instructional methods must be continuously calibrated against the specific contextual factors, learning objectives, and participant characteristics of each environment.

Discussion

Based on the extraction of findings from 116 primary literature, a very strong instructional paradigm dichotomy was identified between the formal educational environment in schools and the coaching environment in sports clubs (Alali et al., 2026). Data mapping confirms that the selection of instructional methods is not single, but is strongly dictated by the demands of the curriculum, student ratios, and the orientation of the outputs of each of these environments (Aprianti, 2020; Mudian, 2018; Siswanto et al., 2022). In the school environment, physical education teachers have been shown to dominantly use a learning model centered on cognitive problem-solving, social participation, and tactical approaches. Teachers extensively apply the Teaching Games for Understanding (TGfU), Problem-Based Learning (PBL) models, as well as game modifications and aids (Gunawan et al., 2024; Daya et al., 2026; Djohar et al., 2025; Ghofur et al., 2025; Oktavianus et al., 2025; Setiawan et al., 2025).

In addition, to reduce the failure of classical movements in crowded classrooms, teachers often rely on the Mosston Teaching Style Spectrum (such as command, inclusion, and self-check styles), the Teaching at the Right Level (TaRL) approach, and cooperative learning methods (Djohar et al., 2025; Rusmanto et al., 2020; Nasution & Tarigan, 2021; Yudho et al., 2022). The integration of local wisdom through traditional games and regional dances has also been shown to be effective in improving physical fitness and gross motor coordination in early childhood (Rohmah et al., 2024; Yoda et al., 2025). These findings confirm the theory of social constructivism, in which the involvement of group collaboration dynamics and modification of the learning environment

(such as modified boccia) successfully accelerates the level of completeness of movement learning in an inclusive manner (Hakim et al., 2026; Khataybeh, 2024; Longakit et al., 2024).

In contrast, in the sports coaching environment, there is an absolute preference for a direct instruction approach centered on biomechanics and muscle memory. To maximize competitive performance, coaches rely heavily on load repetition methods, such as massed practice, distributed practice, as well as part method and whole methods (Dutra et al., 2025; Ruslan et al., 2025; Tangkua, 2017). Coaches systematically use intensive drill methods to accelerate the automation of movements that require high accuracy and speed, such as badminton smash techniques, passing accuracy, agility, and shooting (Al Ajjaj, 2024; Andibowo et al., 2024; Ardhirianto, 2025; Ash Shiddieqy, 2024; Kading, 2025; Novianto, 2021; Nurdin, 2021; Sari et al., 2024; Suparman & Mardian, 2025). These findings are in line with the framework of Information Processing Theory, where the manipulation of training volume through a block approach or random practice is confirmed to be able to create stability and consistency in the execution of movements before athletes are faced with situations of space and time pressure during competitions (Ma'arif, 2024; Rahmatika, 2025).

Optimal mastery of motor skills requires structured pedagogical interventions, where variations of exercises such as massed practice and random practice have been proven to accelerate the consolidation of students' movement memory (Aiken & Genter, 2018; Dutra et al., 2025). Furthermore, cutting-edge innovations in these two environments are beginning to transition towards the use of technology, such as Inertial Measurement Unit (IMU) sensors for real-time kinesthetic feedback, video analysis, and Augmented Reality (AR), which are proven to accelerate the motor learning process with great precision (Da'i & Apriyanto, 2025; Irawan, 2025; Loutfi et al., 2020; Neldi et al., 2025; Setiawan et al., 2025).

The implications of this study require educators and trainers not to adopt one rigid teaching model. Teachers and trainers must calibrate pedagogy that is in tune with the characteristics of their age, motor ability level, and competitive demands of their environment. Although this systematic review offers comprehensive insights, the majority of the extracted studies still purely evaluate performance improvements in the short-term acquisition phase . Very few studies have conducted long-term muscle memory retention tests or motion transfer tests into authentic gaming situations. Therefore, future research is highly recommended to apply longitudinal experimental designs to validate the resilience of motor adaptations of students and athletes in more depth.

CONCLUSION

Based on the results of the literature synthesis, it can be concluded that there is no single pedagogical approach that is universally superior in facilitating the mastery of specific movement skills. Instead, the effectiveness of an instructional method is highly contextual and deeply influenced by the orientation of the learning ecosystem. In formal school settings, physical education teachers predominantly favor cognitive-based approaches and social interactions to accommodate high student ratios, address skill heterogeneity, and encourage active participation. Conversely, coaches in competitive sports clubs frequently employ direct instruction and mechanical repetition load manipulation to refine the athlete's specific movement accuracy.

It is important to acknowledge the contextual nature of these findings; pedagogical choices are not a strict dichotomy, but rather adaptive responses to specific environmental constraints and goals. The selection of instructional interventions must be continuously calibrated according to the taxonomy of movements (discrete, serial, or continuous skills) and the unique characteristics of the participants. The implications of this review suggest that physical education and coaching practitioners should adopt flexible, evidence-based practices, dynamically adapting their methods to meet the specific socio-academic or competitive demands of their environments.