



Insights/Opinion

The fundamentals of the design of organized practice in team sports

Grégory Hallé Petiot^{a,*}, Diogo Coutinho^{b,c}, David Farrokh^d, Sigrid Olthof^e,
Filipe Manuel Clemente^{f,g,h}

^a HEC Montreal, Montreal, Canada

^b Department of Physical Education and Sports Sciences, University of Maia (UMAIA), 4475-690 Maia, Portugal

^c Research Center in Sports Sciences, Health Sciences and Human Development, CIDESD, 5000-801 Vila Real, Portugal

^d Sport and Physical Activity Research Centre, Sheffield Hallam University, Sheffield, UK

^e School of Sport and Exercise Sciences, Liverpool John Moores University, Liverpool, United Kingdom

^f Gdansk University of Physical Education and Sport, 80-336 Gdańsk, Poland

^g Applied Research Institute (i2A), Polytechnic University of Coimbra, Coimbra, Portugal

^h Sport Physical Activity and Health Research & Innovation Center, Coimbra, Portugal



ARTICLE INFO

Keywords:

Player development
Practice design
Thinking process
Game-based training
Enriching environment

ABSTRACT

To be effective, sport practice must be relevant to the circumstances in which it takes place, as well as to the objectives coaches have set to achieve progress. These circumstances involve many sets of information that coaches must weigh, without neglecting their own biases when prioritizing them. As part of their duty, coaches must design and deliver quality activities that reflect the best available approach given the circumstances, which requires a thorough understanding of how modifications to the original game affect practice. Designing such type of organized practice relies on a rich thinking process that has not been studied yet. In this insight paper, we describe key elements of information about the individuals, the environment, and the policies that constitute the ecosystem of organized practice and suggest strategies to structure their articulation throughout the design of team sport activities. The purpose of revisiting the design process is to establish an objective foundation for practitioners as they think through and conceive activities independently, while keeping players at the heart of the process. Recommendations emphasize greater empowerment and use of available information, rather than efforts to set standards, since a process driven by the coach holds more potential for customized solutions than an inventory of variables. In conclusion, practitioners stand to benefit greatly from relying on guiding principles throughout the process, which ultimately frees them from dependence on decontextualized examples. We finally identify the Design Thinking framework as a matching method for completing this coaching duty.

Introduction

The practice of sports is widely discussed in the scientific literature, approaching its issues and challenges from different perspectives, including sport science and coaching [1]. Such scientific production is valuable for the insights it provides for organization of sport practice. “Organized practice” usually designates training activities under the lead of a coach that is intended to influence the lived experience and the quality of participation of audiences, ranging all age groups [2]. Amongst the discussions aiming at organized practice of team sports, specifically, an entire debate revolves around its design [3]. As remarked by the authors, the use of games as engaging and stimulating activities in soccer training sessions is widespread, yet lacks established

standards and guidelines. As a result, concerns arise regarding the availability of quality practice opportunities, since it remains unclear whether best coaching practices identified in higher-performance contexts are truly beneficial for all audiences [4]. Despite increasing investigation in the area, a lack of clarity on the matter can have severe implications on programming and coaching across geographical territories [5].

Modern approaches to team sport practice encourage the articulation of activities resembling to the game, featuring modifications that introduce variability and exploration, especially in the context of youth sport [6]. Combined to this, an athlete-centred approach to coaching supports all intervention, including the design the aforementioned activities, to keep the needs of the participants at the heart of coaching

* Correspondence to: HEC Montreal, 3000 Côte-Sainte-Catherine Road, Montréal, Quebec H3T 2A7, Canada.

E-mail address: gregory.halle-petiot@hec.ca (G.H. Petiot).

<https://doi.org/10.1016/j.tss.2026.100009>

Received 22 March 2026; Received in revised form 16 June 2026; Accepted 25 June 2026

Available online 27 June 2026

3117-8790/© 2026 The Author(s). Published by Elsevier B.V. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

decisions [7]. Being considerate of the participants at hand practically demands coaches to address specific diagnostics and to enrich the landscape of practice opportunities with in-play challenges [8]. Diversified practice design that still addresses individualities is increasingly being supported in sport scientific literature for its positive contribution in most team sport settings [9,10]. The turning point then is that the discussion about using games as practice activities has shifted from whether modifications *are beneficial or not* to the participants to instead look for ways coaches can master practice design to ensure quality in practice.

Although this specific area has seen important practical contributions published in the scientific literature over recent decades, with insights from psychology and athletic development (e.g., [11,12]), the outcomes of discussion still narrows down to *what coaches could or should do*. In these terms, practical guidelines miss out broader considerations that can elaborate the process that empowers coaches to design quality practice. The advantage of studying the process itself lies in the genuine value that a coach can bring to the lived experience as well as the athletic development of participants, from their own perspective.

For instance, quality begins with an alignment of coaching intentions proven relevant to the 3 P's of sport outcome in Côté and Hancock [13], as in Performance, Participation, and Personal development. The 3 P's framework clarifies the contribution of main components that lead to great sports persons and clarifies what assets organizations and practitioners should invest in when designing quality sport programs. Enjoyment and transfer of learning should be treated as measurable but not guaranteed indicators of quality, assessed through a triangulated battery combining participant-reported enjoyment, motivation, developmental experience, and representative performance transfer [14,15]. Sport programming that reflects the 3 P's relies instead on the involvement of qualified staff across an organization, although their contributions are subject to influences that can limit their adherence to policies and planned curricula. Although, practice varies from place to place [16] and duties are not standardized, making it difficult to study the matter systematically.

In sum, we find that the existing frameworks responsible for structuring organized team sport practice are difficult to describe in their current state, given the broad range of influences and local realities they are subject to. We instead find more relevant to revisit the process of designing practice and describe the sets of information that are articulated while designing activities. Revisiting coaches' planning of practice as a process makes it possible to conceive it as a professional duty that practitioners can develop over time. That exercise can benefit the community of practitioners including coaches and other technical staff members if it is based on perspectives enlightening the contribution of design per se and the role of the persons who the designed result is intended for, in occurrence the players.

The aim of this paper is thus to identify and describe the process of designing played-form practice in team sports. To achieve this, we begin our narrative with a review of information important to leaders and instructors responsible for sport practice, as well as the policies governing its organization. The review also covers the principles for designing team sport practice that is joyful and transferable, putting light on the pedagogical levers that played-form activities have to offer. This review follows the criteria stated in the SANRA guidelines for narrative reviews [17]. We then integrate reviewed bodies of knowledge and propose practical levers to structure coaches' thoughts when designing practice, based on the principles of the discipline of design. Finally, one approach in particular is explored for its applicability to complex processes.

The value of this review paper lies in the resources it provides to support better design decisions when conceiving and delivering quality team sport practice, more frequently and across more contexts. Note that we use the terms 'planning' and 'delivering' for practical purposes and in reference to common professional terminology, while acknowledging the conceptual complexity and depth these duties entail. Together, these

duties rather reflect anticipating, designing, conducting, facilitating, implementing, and actively engaging in the training process when needs emerge.

Describing quality sport practice and its provenance

Interest in the design process grows in the context of an abundance of ready-to-use examples, theoretical models, and complementary documentation about the game and influential coaches who have shaped its evolution. Technical information of this nature is reportedly meaningful to the coaching community although its applicability to different environments is questionable. Personal and environmental constraints experienced by coaches tend to be disregarded in published examples, since those examples are products of a specific context. Yet, limitations are information of great importance because they are at the root of the design process.

In essence, examples and creations are conceived from the manipulations of parameters of the play, which coaches add, remove, or modify in their configuration [12] to explain, anticipate, and/or guide behaviors. Manipulations are meant to amplify or limit the available information (e.g., adding targets increases the number of possibilities to shot, affecting both the actions and decisions of the offensive and defensive team) and consequently, the actions players can afford to explore and perform in the play [18]. These manipulations apply to the task (set-up/design of the activity/drill/exercise), the environment (context of play), and/or to the individual (participant). For example, coaches may adjust the available space (i.e., size, shape, orientation, surface), number of players (i.e., playing in superiority, inferiority or balanced scenarios) and game rules (e.g., mandatory three touches before passing the ball or receiving just with the weakest foot) to vary task constraints [12,19]. These manipulations are related to spatiotemporal features of the practice conditions that will shape players' movements [20] and offer coaches opportunities to intervene on the "when", "how", and "where" of performed actions [21]. As the science on the matter continues to grow, manipulations count among many changes censed in Table 1.

Following the ecological model applied to sports [22], task

Table 1
Summary table of censed boundary conditions and constraints.

	Typical example	What it usually is	Why
<i>Organismic</i>	Dominant hand/foot or current body height and weight	Boundary Conditions	Property that does not <i>forbid</i> actions
	Pain/injury status	Constraints	State that limits mobility
<i>Environmental</i>	Current fatigue or motivation	Constraints	State that limits actions and predisposition to behave
	Ground material (type of ground), temperature, lighting	Boundary Conditions	Surrounding settings that do not ban behaviors
	Ground conditions, weather conditions	Constraints	Surrounding settings that are likely to affect behaviors
	Cultural and social influences	Boundary Conditions	Background settings that might influence behaviors
<i>Task</i>	Task restrictions (e.g., "you can't dribble")	Constraints	Added rules that restrict admissible actions and narrow affordable behaviors
	Playing area, number of players, scoring rules, and coach intervention	Boundary Conditions	Game settings that guide the response from the players
	Rounds of bouts and trials	Boundary Condition	Restricting roll-out protocol

constraints and boundary conditions are changes that apply well to actions performed in open environments such as team sports. They can be deliberate manipulations utilized in organized practice [11,23], making changes and their effect the core of quality across team sport settings, including high performance competition [24]. While boundary conditions and constraints are concepts still being discussed in the literature, we intended to differentiate them for the role they fill in the planning and delivery of organized practice. Based on the references cited through this article, boundary conditions delimit the play settings and circumstances as a *space* to explore as they define what you can or cannot do for the game to operate. In contrast, constraints narrow possibilities of actions in the play as they force players to do something specific over all the actions that are afforded.

Note that boundary conditions cannot always be modified, although when they can, the choice of corresponding manipulations is highly contextual. This means manipulations in some circumstances may not be suitable in other circumstances, to the risk of decreasing the quality of practice. Coaches are thus expected to choose manipulations wisely, most of all depending on the circumstances that make sense, as opposed to picking a combination assembled in another context. This reflects one of many expressions of critical thinking encouraged when facing a problem or situation that requires a solution, as suggested in the coaching approach labelled ‘it depends’ [25].

With respect to the importance of circumstances, we suggest that understanding the design process per se is one powerful way to interpret, tailor, and assemble activities, to tap into the potential of quality practice. In the ecosystems that are targeted in this paper, the planning and delivery of practice are duties that coaches must complete or oversee on a regular basis. Efficiency and clarity in the process can have a sustainable, positive effect on the practice taking place in sport clubs, community programs, and comparable organized sport settings. Investigating the process with a scientific approach is to our eyes a relevant contribution but still relies on the acknowledgement of its qualitative nature.

The core elements of quality organized practice

There exist fundamentals that are both transversal to different lenses (i.e., developmental, operational, managerial) and relevant to any thinking that practitioners should go through to set good basis for practice design. Following the core guidelines of the ecological dynamics and critical thinking frameworks applied to sport, fundamentals target the participants, the environment, and the ecosystem [26].

Stage and State of participants shape the individuals

The literature identifies the calibration of activities as one crucial principle of practice, [27], which involves assessing the current stage and state of participants. While stages of development and practice are defined across a lifetime (e.g., Long-Term Athlete Development, [28]), stages of the development of skillsets solicited when playing are rather associated to competencies. Further complexity arises from the cognitive abilities associated with decision-making during play [29]. Performance observations made by coaches and other technical staff span all dimensions of individual development, making assessment complex and potentially biased. It must be noted however that skillsets do not exclusively depend on chronological age. Inequities provoked throughout the talent selection process across different ecosystems and basins of players were reported due for instance to developmental advantages conferred by early growth spurts or earlier birth date within a same age category [30]. As a result, disparities within a single training group may reveal mainly physical advantages that coaches could associate with specific positions on the field [31].

Coaches are therefore expected to be informed about developmental stages in order to calibrate sport practice effectively. The same applies to the current state of the participants since the daily life, especially

through growth, features important variations in sensitiveness to life events, well-being, and motivations, which translates in the readiness to play. A notable focus on well-being [32] is leading the promotion of monitoring of the athletes over time, adding up to dispositions to track physiological load (e.g., Rate of Perceived Exertion). The data that these tools provide to coaches help making adjustments to the activities and stay aware of experienced variations in readiness. This way of working allows to put in place activities, following remaining principles, that promote exploration over prescription of actions, still in syntony with the circumstances of the moment [6].

The information about the stages and the states of the participants emerge in different timeframes as development does not happen overnight, in contrary to changes of states of readiness. Whilst some predispositions are more common in higher performance (e.g., daily questionnaires), the principle of being proactive in getting relevant information and calibrating activities upon it is a recommended approach to training. It also reinforces the importance of placing the individual at the centre of coaching [33]. Following the perspective adopted in this paper, such approach to sport practice is the one that differentiates organized sport from sport overall.

Circumstantial constraints shape the environment of practice

Most practice environments have limited resources and field availability, requiring coaches and educators to be creative in how they use available space. For instance, practicing on a fraction of a pitch under the lead of one single coach contrast with full pitches usually available to professional teams. These limitations constrain design flexibility [34], requiring coaches to prioritize tasks, sometimes with simpler structures and fewer manipulations.

Other constraints are imposed by rigorous seasons, imposing the usage of indoor facilities. The local weather implies series of adjustments on the usage of space, the timely management of the surface of play, scheduling, clothing, hydration, and transportation, amongst others. Similarly, arrival times may vary due to factors such as commuting time or parental availability. To accommodate this, coaches may design simpler activities that engage early arrivals and recalibrate the time reserved to the activities that were planned initially. In addition, practice design should also be based on the time of the day, considering the circadian rhythm influences the state of readiness [35].

Designing practice activities must therefore align with time and space restrictions to make activities successful, and rather useful. A creative yet pragmatic use of space and time is necessary to optimize training efficiency, but requires advanced planning. On the other hand, time and space are at the root of tactical conceptions of the game itself [36]. As practitioners calculate in space and time, they are in good conditions to maximize representative tasks [37,38] in the form of different formats of the play. The available space and time for training sessions indicates what can be afforded at a current occasion and hint what formats between smaller and larger versions of the play can be configured [39]. Thinking in “formats” gives a rich range of possibilities to which further details can be added to either achieve objectives, including physiological stress [40], technical-tactical skills development [41], and even psychological improvement [42]. The potential to achieve objectives will in turn depend on the time invested in a planned activity to explore its configuration. On the other hand, coaches want to keep their players sufficiently interested so that they continue looking for solutions, which could fade away if an activity is too long.

Coaches must account for a variety of dynamic factors in order to address participant needs and objectives through practice, which may affect the feasibility of some activities over others [43], which may affect the feasibility of activities over others. Coaches can nowadays benefit from a rich literature about the parameters to play, each one with their respective effects on space and time. They also can structure their design by informing all three elements of design. One objective would in that case be to educate more coaches on this structure for designing

activities and to tool them up to remain at the heart of the conception of activities. Beyond that objective however, coaches should familiarize with a higher stratum of considerations to make even better design decisions, that is sport policies.

Policies in place shape the ecosystem

Considering the significance of the Long-Term Athlete Development (LTAD) model [28] in the literature about sports, we sought to review policies across the full lifespan of sport practice for an individual. Despite differences in wording and naming (e.g., “Foundations, Talent, Elite, Mastery” or *FTEM*, and “Canadian Sport for Life Leadership Team” or *CS4LLT*) [44,45], these policies outline key steps in athlete development and reinforce the need for access to specific resources and support to achieve progress and performance. Such guidelines indicate contents to invest on and the conditions to look for to answer the demands of active living of a vast majority, which influences the choice of activities in a region or country.

Recommended policies supporting the organization of sport practice in the form of a long-term investment are in line with the phenomena surrounding early specialization, the lack of deliberate practice in the contemporary lifestyle, and the timing of more commitment towards one modality. Côté and Hancock [13] have reviewed evidence supporting the diversification of practice (i.e., different modalities, contexts of practice) until early adolescence, highlighting that such approach does not hinder results in higher performance later. The outcome of this review also highlights the importance of organizing competition so that it gives more room for diversification, deliberate play, and healthy competition opportunities. Grassroot programs featuring more diversified physical literacy opportunities is therefore presented as a relevant and positive solution for the first stages of practice. Notions surrounding a more positive organization of practice at early age also naturally lead towards a balance between the 3 P’s within practice [46].

Whilst policy development encompasses time and resource considerations, it also influences equal access for opportunities of quality experience. On one side, stages covered in the LTAD start from physical literacy in early age to active living initiatives, counting with competition stages at the heart of practice pathways. There however exist opposing forces exerted by local sport values, customs, and organizations that also implicitly influence the design of practice such that short-term gains may become prioritized over the longer-term investment [47], even if channeled in policies. The allure of practice in eye-catching high-performance footage, sometimes made available on Internet, count amongst examples that risk disbalancing the repartition of efforts and let shorter-term performance dominate planned activities. As a result, the development of abilities needed to excel in a given sport (e.g., technique, physical conditioning, mental skills) varies from place to place, depending on access and quality of investment, including positive youth development [48].

While an “equal access to quality over time” policy is benevolent, it is still subject to differences in sport leadership and jurisdiction between administrative territories within a same country. Tensions may for instance arise around the autonomy of states and provinces due to local realities to manage. Based on our review, it is clear that policies point to important investments and organizational structures needed to support sport practice, to the point where they should inform the design of played-form activities. Amongst them, details in the LTAD and public policies are of great importance in the creation of curricula and should be communicated to and acknowledged by coaches in the process of designing practice.

Practical examples

On one extreme of the range of possibilities in practice design, the duration of activities and the dimensions of the playing area can be defined by the physiologists who control the load of exertion. This alone

requires a multidisciplinary technical staff equipped with the resources needed to calculate and monitor the load and combine them with technical-tactical objectives. Activity designs are thus based on the intended game model (i.e., a way to play). Coaches responsible to drive their team to results usually aim to start from a diagnosed problem in an audience [39] and craft practice according to the issues or building blocks to be addressed. As noted by the authors, coaches’ diagnostics is a premise for design, but it is already very rich in information. Such advanced structure is witnessed in professional clubs, and it reflects decisions aligned with the capabilities of the participants and the need for performance.

In other settings, circumstantial restrictions such as limited available space end up discarding options, instead requiring coaches to design activities that fit in the conditions that are offered. For instance, educators involved in community programs, physical education in schools, or even youth club-based practice would rather bid on inclusion, equity, and positive interventions in simpler activity designs. Here, the constraints and policies lead the requirements for practice configuration. The two opposite examples specifically emphasize differences in the conditions where practice takes place, and between the starting points that initiate the design. It is therefore expected that a design process carried relevant and useful elements of information that empower the delivery of consequent and coherent practice opportunities, based on the starting point.

Interpretation

Combination of circumstances following the description above define the conditions in which coaches are responsible to design and deliver practice [49]. Coaching decisions that arise from the anticipation of these circumstances all result in behaviors in the play that will again be appreciated by the coach in place [50]. This means that both ends of the process consist of sets of information that are essentially qualitative, complex, subject to judgment, and articulated within potentially short timeframes [51]. Moreover, the information described earlier is processed from the perspective of the coach, which is built over extended time, experience, problem-solving, and education [52,53]. This shows how much the process itself puts the coach at its heart, regardless of the inputs and outputs of information [53].

A distinctive feature of the sport ecosystem is that practitioners’ knowledge of the game is reproduced within communities [52]. One example is the “way to play” the game can be recognized from place to place from the signature in the actions [54]. Similarly, the “way to train”, depicted in traditional practice customs and habits, also reflects the practical knowledge that is reproduced within communities of practice [52]. That means, despite individual preferences, *ways of practicing*, operating training, and intervening all anchor in practitioners’ mind. Amongst learnings, examples kept in memory are a practical solution that considerably alleviate the planning duties, like writing and drawing sessions plans.

We can therefore observe that design in fact originates from personal habits, the lived experience of coaches, and their priorities [49]. This starting point primarily parses the “how” of training and monopolizes conversations to the detriment of the sets of information that characterizes the circumstances, in essence its “why” [50]. This implies policies defined for the greater public are subject to be bypassed or replaced by different priorities that can confer to a program or organization a distinctive value but also deviate from the social agreements that are communicated by governing bodies. In this line of thought, we represent the design process as inherently biased roadmaps, directed from sets of information that are naturally filtered by the coach in place.

We therefore contend that an analytical approach to the practice design challenge translates into processing demands or information overload that coaches may not be able to manage. Neither an in-depth analysis nor the standardisation of designing practice reflects a pertinent investment as all elements of information that were mapped in our

narrative may not be integrated in the process, everywhere, every day. The key message here is that the need to meet in the matter is to provide better practical solutions to the current duty of design. Since organizations and coaches face an extensive load of choices to make, they are entitled to tools that empower problem-solving, in such case in the form of training activities [55]. This becomes even more important when sessions are built around individualized engagement, feedback, and evaluation. While coaching courses encourage reflecting on choices without proposing leverage for critical analysis (e.g., remuneration of the time spent for planning), knowledge bases now available on the internet still require study time and paid subscriptions [56]. To us, the useful tools for the coaching community rather lie in strategies that empower to think clearly and design practice efficiently, in current conditions.

The design process and thinking strategies

Despite the potential of played-form practice to enhance the participants' experience [23,57], the responsibility to design them can pressure coaches into making complex choices, particularly when they encounter obstacles, whereas familiar solutions might suffice. The conception of played-form practice then reflects a challenging task for coaches and educators, even more so if they must process a lot of information and adapt over again. Given the significant cognitive load coaches face when directing their thinking throughout the design process, structure becomes essential.

Structured thinking puts coaches in a better position to address current issues or pursue coaching objectives, one way being to tailor the configuration of activities to the needs in the circumstances [26]. It more specifically allows to translate the information coming from (1) the current characteristics of the participants within their development; (2) the circumstantial constraints experienced by the coaches within the practice environment; and (3) the policies defined in the different governing strata of sports. One way to proceed with structure is to make sure to inform the parameters that address the three core elements that constitute the design of played-form practice.

The core elements of played-form practice design

A structured practice design process is one that articulates the core elements that compose practice, in occurrence here the modified versions of the game. Time and space variables mentioned earlier imply a coherent assemblage of content and contexts through the configuration of activities. Contents are sets of notions introduced to players, including cues, ideas, and intentions to pursue when encountering situations in play [41]. These notions can be explored in activities staging situations of different levels of complexity (i.e., the numbers of players involved in a situation) and difficulty (i.e., the number of options in a situation) [58]. Because all this coaching input adds to the inherent interaction between players, space, and ball (or other object), contents are usually funnelled down through thematic. Thematics frame coaching interventions and are typically introduced at the beginning of a training session.

In turn, contexts are assimilated to the aforementioned "formats". As

coaches define the contents they want to cover and the context in which these are best staged in, the configuration of practice is completed with task design. These last details are expressed in specific demands (i.e., technical execution) over actions in the play, influencing fluidity and success. The model introduced by Petiot et al. [18] in Fig. 1 features these three elements of design, namely the thematic, context of play, and demands in one illustrative model for designing played-form activities that pursue coaching intentions. Intended effects designate the outcome toward the participants and are reflected in the deliberate configuration of each element of design.

As discussed in contemporary literature about sport, environments of practice that are crafted to enrich the user experience are made from stimulating manipulations prior to instruct actions to participants [8]. Further literature on skill development continues to highlight the effects of task constraints and boundary conditions, whether they be natural (e.g., dry or wet surface of play in Brito et al. [59]) or artificial (e.g., game rules in Machado et al. [60]). This is how participants are kept involved and encouraged to express themselves through exploration and way-finding [61]. Following these principles to learning in action, further compatible pedagogical mechanisms can be activated as long as activities are crafted for representativeness, variability, and the simplification of the task amongst other principles [6,41]. This conception of involvement puts participants at the heart of design considerations.

It is in this spirit that the Ecological Dynamics model [62] has been the subject of significant advancements in Physical Education and Sport Pedagogy, providing with strong theoretical base, practical applications, and well-established models in many sport settings, including youth sports [6,63]. As a result, game-based approaches to practicing team sports are exemplified, analyzed, and reported for the increased engagement, enjoyment, and repetition they provide, for the benefit of retention and transfer. Approaches that have been extensively covered in the literature include Teaching Games for Understanding [64], Game-based approaches [65], and Sport Education [66] and that are now praised for their added value in the practice of sports [10]. Athlete-centredness also encompasses the spirit behind aforementioned models [67].

The effect of configuration on the look and feel of the play

The puzzle still lies in the choice of manipulations, specifically in the ones that will pay off. Thinking strategies should therefore guide coaches by encouraging them to assess the look and feel of the intended version of the game, and subsequently make any necessary adjustments. The result of a configuration is an allure of the play that fluctuates between a look and feel that is faithful to the original configuration of the game, or on the contrary, divergent. Configurations display different scales or varied arrangements that participants are invited to explore. Divergent play contexts should be regarded as stimulus-rich, but must be approached with clear objectives in order to produce a positive effect on participants.

If the competitive advantage lies in the potential that coaches want to pull out from divergent configurations, the rationale behind the manipulations must be made explicit through the thinking process. Once embedded into the design, justifications help enriching the

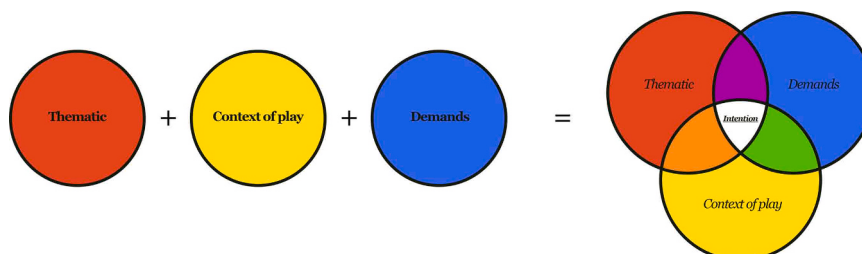


Fig. 1. Explanatory display of a proposed model for the conception of played-form practice in soccer [18].

configuration following a chosen approach to a problem over another [41]. For instance, emphasizing contents (i.e., lessons, situations-problems, notions) in which positional play is less rigorously insisted on can lead to less representativeness and allow more exploration of core principles.

As noted by Clemente et al. [12], configurations are versions of the play that can be compared to the original competitive settings in terms of representativeness, integrality, and specificity. Such classification was suggested for its ability to identify and describe distinct elements of the play that resemble to or differ from competition. Clearly pointed out differences enlighten the way a custom variant serves the purpose of practice, may it be to explore or to work on specific contents [39,41]. If representativeness can for instance specifically serve to report differences, it also embodies a thinking strategy that can be communicated in the form of a decisional tree. As summarized in Table 2, each characteristic was introduced and exemplified using criteria, which implies they can be translated into questions to ask whilst drafting the design of an activity. Questioning is efficient especially if the answers hint the parameters to be revisited and if they translate into clear justifications behind designing choices.

Our intention behind the categorization of criteria was to establish practical links between the allure of the play discussed earlier and possible manipulations. We must emphasize that these links are not exclusive; they were rather organized to structure thinking pathways. We also support the idea that characteristics can be utilized as

descriptive benchmarks to situate activities in a complete cursus. By suggesting that thinking can be efficiently directed, we recognize that tools influence choices, and most importantly, they lead practitioners to revisit conception and planning decisions over time. To us, a repeated and devoted experience in such designing process is expected to sharpen the appreciation of these criteria in a single eyesight. Drawing on the characteristics listed in Table 2 is a valuable design strategy that provides alternatives to the original game that are ‘good enough’, can be implemented quickly, and preserve the unpredictable nature of play [68].

For more clarity, we have exemplified in Table 3 a series of soccer activities and pointed out in numerical order the elements of information that were specified in the design. Each exemplified thinking pathway is based on a selected audience and plausible environmental conditions (e.g., shared space on the pitch). To inject as much realism as possible, each scenario is associated to a relatable environment, the objective being to portray as clearly as possible the starting point, the processing of information, and the references to elements of design. The examples are featured in the form of cards with drawings and attached information to specify respective details.

It may be useful for practitioners to consider the performance context (i.e., the official match format) of a given sport as part of a network of activities that mutually influence one another. For instance, the performance context for a soccer team in an area where futsal is also played may include opponents who utilize elements of futsal (e.g., manipulating the ball with the sole of the foot). Conversely, the local style of soccer will also likely shape how futsal is played — the influence is bidirectional. While training activities are preparation for the performance context, the sum of training activities utilized within a local competitive landscape also shape the composition of that same performance context. Thus, the design of training activities takes on the additional meaning of contributing to the local competitive ecosystem.

Considering that the configuration shapes the structure of affordances (i.e., opportunities for actions) [39], practitioners can deliberately make activities experiential. For instance, replacing a central goal with two goals positioned in the corners of the pitch creates a metastable region in the centre of the pitch (where the affordance to attack the goals overlaps). Because participants are expected to experience increased attentional engagement in such regions, their temporal and spatial distribution should be considered in the design process. Hence, shaping activities to influence the course of actions and potentialize targeted behaviors is the idea behind representative design [69–72]. This reflects a great advantage of the approach suggested in this paper as designing enables practitioners to consider manipulations through their influence on the dynamic contour of gameplay, which is what participants experience.

From a broader perspective, the contribution of customized activities can be considered to extend beyond transfer of learning to a performance context to more explicitly include the experience of the activity itself and its implications for participation. In other words, it is unfair to only assess a game like futsal as a training activity for soccer—it is also a sport in its own right. To a lesser extent, commonly adapted games such as “soccer tennis” may also attract intrinsically motivated perception based on the experience of gameplay. Thus, practitioners can stimulate their thinking by asking what it would take to design an activity that attracts this type of participation.

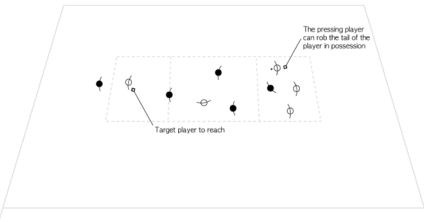
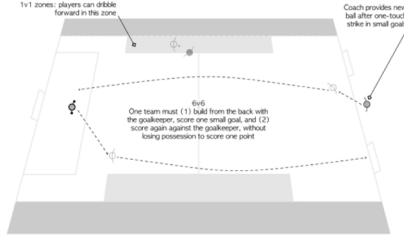
In that line of thought, practice that is predominantly based on activities that look and feel just like the original game may hold back the ability to adhere to divergent environments and compose to variability. Nevertheless, participants who are used to dynamics of the play similar to the original game can find it difficult to perform in new, divergent configurations. For this audience, enjoyment and quality may be limited to a family of activities as divergent activities feel demotivating. Despite changes between training approaches do happen, for instance when teams change coaches or technical staffing, the need for the design continues requiring care for the participants.

Table 2

Summary of theoretical background, criteria and corresponding display, together with suggested questioning and the parameters that can be influenced by the answers.

Definition	Representativeness	Integrality	Specificity
	The nature of information displayed in the original settings of the game	The quantity of interactions occurring in the flow of play	The focalized contents articulated as a working purpose within the play
Criteria, display	Organization of space: • Direction of actions • Distances / space • Realism and meaning reflected in the actions and where they are inserted	Allure of sequences of play: • Scope of allowed actions • Scale of the portion of play • Competitiveness	Orchestration of repetition: • Clarity of intentions • Team organization and roles • Coherence of context
Questioning	• Is the direction of actions necessarily from end to end of the delimited area? • Does the ratio <i>player:space</i> make players afford relevant or targeted actions? • Must space be proportional for targeted actions to take place?	• Can some actions hold players back from performing targeted actions? • Are all moments necessary for targeted actions to take place? • Is winning more important than performing targeted actions?	• Are targeted actions informed in the thematic? • Must players perform targeted actions under a pre-established organizational scheme? • Do players act upon the official rules of the game if applicable?
Parameters	• Shape of the delimited area • Proportions and dimensions of the area of play • Type and size of targets	• Game rules aiming at the allowance of actions or their execution • When and where the play starts and stops • Putting the score at stake*	• Imposition of team formation and assignation of roles • Deliberate numerical [im] balances • Game rules associated to custom landmarks

Table 3
Comparison of exemplified rationale and configuration.

Exploration activity in a co-ed youth soccer program based on PYD policies	Skill-based activity with academy boys based on formative curricula	Team preparation with women seniors starting players based on adapted load
<i>Context: a group of young boys and girls taking part to a community program, focussing on positive life skills</i> (1) Policies: Inclusion and equity as core values (2) Intended effects: generate cohesion and communication between players (3) Context and Task design: Simple settings that emphasize one line of defense to break and a clear opportunity to keep the ball, with the “safe” threat of being robbed a tail <i>Rationale: the mission of the program subscribes to public policies and prioritizes the development of skills encouraged in the society; activities are a medium to put participants in interactive situations without the risk of injury; easy-to-recognize arrangement of the area of play and simple rules that keeps the flow of the play.</i> Conditioned Game  5v4 in a rectangle cut in 3 zones: (1) 3v1 in the first zone; (2) 1v2 in the second zone; and (3) 1v1 in the last zone. White players must pass the ball to the player in the second zone, and that player must reach the player in the last zone to score a point. Dark players can intercept the ball or rob a tail to earn a point. Players are free to pass or dribble but lose ball possession if opponents rob their tail (bib in their shorts) when they have ball possession.	<i>Context: a training group of talented boys taking part to a weekly club-based program aiming at game-related abilities</i> (1) Curriculum: Technical preciseness as a priority (2) Thematical demands: Use both feet at all times to keep ball possession (3) Context of play: Stimulating small-sided game with a wide range of possible actions (pass, 1v1, dribble and shoot) and transitions at loss of ball possession <i>Rationale: the purpose of the program is defined through the curriculum and offers extra training to committed members of a club; the challenges raise expectations and put participants to the test; small-sided games with changing task rules made competitive to keep the thrill and challenge alive.</i> Small-Sided and Conditioned Game  6v6 in a restricted pitch pitch where targets differ between ends of the pitch. Teams must also organize roles and positions as the play rolls. The team in possession has 2 objectives to score a point: (1) score first-touch in the small goals and (2) score against the goalkeeper in the opposite way with the second ball provided by the coach. The game is played with two touches minimum, using both feet every time they touch the ball when in possession.	<i>Context: a squad of competitive girls taking part to a regular team training session planned ahead of the upcoming game.</i> (1) Periodized Constraints: Delimited area for intermittent effort activity that mimics real competition (2) Planned context of play: Half-pitch analytic with limited wide areas (3) Task design: Time-based restrictions and consequences at ball loss, challenges associated to first-touch finish which involves outnumbering the defense line <i>Rationale: carefully planned training regime for high-performing team with calculated exertion and targeted team organization; challenges and context put planned starters in an anticipated scenario; constraints lead to intended behaviours in a highly representative and realistic configuration.</i> Analytical Gk+6v7+Gk  7v6 with goalkeepers on each team. The white team is organized in Gk-2-1-3 and the dark team is in Gk-2-4-1. Two neutrals are on each sideline. The white team is challenged to break the midline of the dark team and attack the goal keeping their time in advance. Teams are composed with key starting players. The total duration is 14 min of active playing time. Each trial is separated with a 10 s pause.

With this structure in mind, coaches can ideate the configuration(s) that best stage the needed situations of play and the notions that are sought to be put to practice, without distorting the nature of the play. As part of this nature, unpredictability is, and should remain, central to the design of activities intended for player development. It thus should also remain a crucial component of practice in the way it is planned and managed. Here, the concept of flow [73] can be of use. Farrokh et al., [57] proposed that sports emerge through the selection of replicable constraints which increase participation by facilitating optimal experiences such as a sentiment of effortless success (the flow), even for short periods of time within the game. An ecological dynamics perspective further suggests that attentional engagement – a precursor to flow – increases with proximity to the affordance boundaries that athletes co-adapt to [57].

The applicability of design thinking framework

Considering that the design process varies in starting points, in the access to influencing information, and in the usage of that information in adjusting plans, we maintain that the process itself remains tied to the specific situation and the coach involved in it. In fact, the conception of practice remains an important piece of the daily involvement of coaches for the sake of durability in the participants' pathways. A useful approach to organizing this varied information is to empower the process without standardizing it [6]. Our analysis of the process highlights that designing practice aims at the participants, it is based on the specific contexts where it takes place, and thus it is iterative. This description makes the Design Thinking framework relevant to designing quality activities [74]. The process begins with empathizing with the participants, for instance by understanding their current state and their experience. It also allows to pursue objectives, including to meet development needs, with the resources coaches are provided in their environment.

Design Thinking, described as a human-centered approach [74] targets higher levels of strategic direction by addressing daily problems experienced by users [75]. The Design Thinking framework has not been specifically applied to sport practice yet, in the capacity of supplying tailored environments for teaching, learning, and training team sport games. However, it has reportedly been applied to review complex processes comparable to played-form practice design, given the many ways such practice can be configured and delivered. In respect of the idea that there is no single recipe nor copy-and-paste possible in creating tailored practice sessions, assembling activities that complement one another, or even designing single activities [76], this framework delivers an enlightening interpretation of the planning and delivery processes entailed to the duty of coaching team sports.

With respect to the core sets of information we have revisited in this

paper, together with the recommended structure of thinking, the representation we make of the process can be illustrated as a function machine, or “In-And-Out box” like portrayed in Fig. 2. The input is the preliminary information about the individuals, the environment, and the ecosystem [26]. In practice, all the information must not necessarily be mapped over again every new design, although for the purpose of this demonstration, we will refer to all the information useful to the design of quality practice. In a function machine, the role of the transaction is to transform the initial input. In the case of practice design, this is where and when the negotiations take place. The coach judges what is best suited to the circumstances, identifies opportunities to influence the group and individual participants where constraints shape practice conditions, and selects the elements worth prioritizing [26,77]. The principle remains to judge the best to do with initial priorities in mind, which is transversal to complex problem-solving in general [77,78]. Finally, the output is the custom solution in the form of an activity design with the details of its configuration and the role of the coach to deliver it. As suggested, the output is identified as the “how” but it was generated to answer the “why”.

As defined in the Design Thinking framework, this inherently iterative process allows coaches to test and re-test combined configurations of activities over time, feeding their own development as practitioners. The process is made of steps that coaches have interest in repeating many times to improve at designing. The idea of adjustments is also in line with recommendations to plan variability within a same activity. Manipulations – i.e., changing game rules, adding and removing task constraints or boundary conditions – can in fact portray a user experience that evolves over a duration as short as one single activity. It is with such mindset that coaches are encouraged to take full chances on their own diagnostics, to the risk of failing at a few attempts. In the context of regular organized practice sessions, more particularly, coaches have many opportunities to brainstorm, let one idea lead to another, and reuse solutions. Generating activity ideas also means repeatedly testing hypotheses.

A plausible example of the Design Thinking applied to played-form practice features a coach responsible for a young group of players amid their adolescence. The coach is fairly informed of the variations taking place at this age and has had enough time as their leader to have a clear diagnostic in mind. Since the most recent involvements of this coach were at the senior level, the bank of activities is not directly applicable at this time. He or she must then get back at tailoring calibrated activities to keep the young players motivated even if the team has access to a full pitch/court only once a week. The plan consists in testing different formats that fit in the space afforded across a weekly cycle, serving as tests towards the players' appreciation and response to the load. This helps to discard activities that do not correspond to enjoyment nor motivation. Further detailed manipulations are

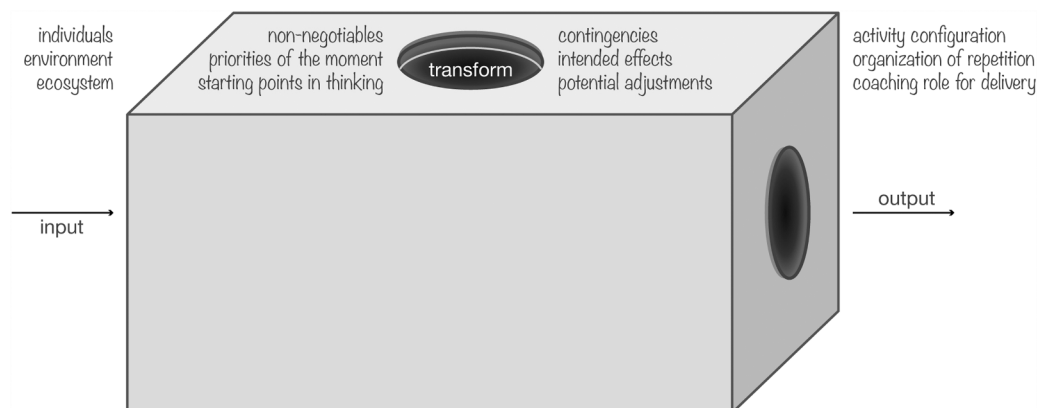


Fig. 2. Suggestive illustrated representation of the design thinking framework integrating the elements of information involved in the design of played-form practice design in team sports.

subsequently tested while carrying on through lessons and takeaways. In term, the coach has a map of the conditions that drive progress and the ones that are still to take advantage from. He or she must therefore return to tailoring calibrated activities to keep the young players motivated, even though the team has access to a full pitch or court only once a week. By the end of the season, the players have been exposed to such variety that they don't remember being demotivated that year, and are all sharing their interest in staying in the team the next season.

In the context of abundant suggestive examples, plug-and-play examples, and session designs shared from professional sports, Design Thinking reveals as an empowering approach for both coaches and participants. It reinstates the value of starting with a good understanding of the context. As defined, designing from initial information allows to generate a solution that fits, increasing the chances of reaching success. In these terms, *designing* substitutes the consultation of uncontextualized examples packaged in magazines, coaching manuals, or video tutorials with structured thinking strategies that help coaches using information at hand. Our stance reinforces that imperfect usage of information still make activities useful *by design*. Approaching practice planning as a design process thus helps mapping thoughts over time and ultimately optimize them for better efficiency one session after another, especially since the state of knowledge around practice is rich but not standardized.

Implications and conclusion

This paper brings light on the value of played-form activities for their contribution to enjoying and motivating practice of sport, judged in this paper as a proof of quality in organized team sport practice. This value particularly stands in the way activities are configured. The object of discussion in this paper was the elements of information and the structure that helps clarifying the process itself, which, even if biased, is how design is empowered. Akin to the notion of a toolbox for practitioners [79], structured thinking becomes a key asset in practice design.

The Design Thinking framework reflects a structure of thought that is applicable and favourable to coaches in their day to day. The specificity of solutions generated through Design Thinking make an important point that training activities should be considered as case studies, specific to the modality, the experienced settings, and the objectives that are pursued. As part of this approach to planning practice, attending to the delivery of sessions and drawing lessons from participants' responses can be valuable over time, enrich pedagogical approaches, and meaningfully support progress. With respect to the notions articulated in this paper, including the elements of design, progress in quality stands in the ability of practitioners to start with less, put themselves into the process, and grow ideas along.

Future research directions include studies in large communities of practitioners [26] that would aim to portray current or distinctive design processes, for instance through the Think Aloud methodology [80]. Exemplifying thinking behind practice design through academic works would be a meaningful contribution to the field although to our eyes, there is still to be earned by practitioners, for instance empowering designing as an alternative to catalogs of examples. From a practical perspective, hybrid productions tying academic and practical works together would significantly contribute to the state of art [63]. Clearly, we wish that a toolled-up design process translates to more owning from more coaches. Designing in itself responds to a contemporary need, since 'more of the same' is no longer expected to lead to meaningful achievements, including in the development of sport.

CRedit authorship contribution statement

Diogo Coutinho: Writing – review & editing, Visualization, Validation. **David Farrokh:** Writing – review & editing, Validation. **Sigrid Olthof:** Writing – review & editing, Validation. **Filipe Manuel Clemente:** Writing – review & editing, Supervision. **Grégory Hallé Petiot:**

Writing – review & editing, Writing – original draft, Investigation, Formal analysis, Conceptualization.

Funding

This work was supported by Mitacs through the Mitacs Accelerate program (IT49342).

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

To Professor Laurent Simon from HEC Montreal for helping with notions about design thinking and their applicability to the design of sport practice; and to Ige Egal from Play for Dignity for helping with the understanding of public policies around sports.

Declarations

There is no conflict of interest to declare.
No data was utilized to realize this study.

References

- [1] Bergmann F, Wachsmuth S, O'Connor D, Larkin P, Dugandzic D, Höner O. Practice design and coaching to support learning in elite youth soccer players: recommendations from international coaches, coach educators, and researchers. *Int Sport Coach J* 2024;1(aop):1–14.
- [2] Côté J, Baker J, Abernethy B. Practice and play in the development of sport expertise. *Handb Sport Psychol* 2007;3:184–202.
- [3] Beato M, Praça GM, Iacono AD, Afonso J, Gualtieri A, Hulton A, et al. Framework and consensus statement for the implementation of sided game training in football (soccer). *Int J Sports Physiol Perform* 2026;1(aop):1–10.
- [4] Kirk D. Framing quality physical education: the elite sport model or sport education? *Phys Educ Sport Pedagog* 2004;9(2):185–95.
- [5] Bean C, Shaikh M, Forneris T. Coaching strategies used to deliver quality youth sport programming. *Int Sport Coach J* 2020;7(1):39–51.
- [6] Chow JY, Komar J, Seifert L. The role of nonlinear pedagogy in supporting the design of modified games in junior sports. *Front Psychol* 2021;12:744814.
- [7] Romar J-E, Sarén J, Hastie P. Athlete-centred coaching using the sport education model in youth soccer. *J Phys Educ Sport* 2016;16(2):380–91.
- [8] Ribeiro J, Davids K, Silva P, Coutinho P, Barreira D, Garganta J. Talent development in sport requires athlete enrichment: contemporary insights from a nonlinear pedagogy and the athletic skills model. *Sports Med* 2021;51(6):1115–22. <https://doi.org/10.1007/s40279-021-01437-6>.
- [9] Côté J, Verimaa M. The developmental model of sport participation: 15 years after its first conceptualization. *Sci Sports* 2014;29:S63–9.
- [10] Moy B, Gorman A. Making physical education popular: the impact of the constraints-led approach on physical education students' intrinsic motivation. *Phys Educ Sport Pedagog* 2025:1–18.
- [11] Bromilow L, Milne N, Woods CT, Dowsett CK, Keogh JW. The effectiveness of linear and nonlinear pedagogical approaches in team-invasion ball sports: a systematic review. *Sports Med-Open* 2025;11(1):90.
- [12] Clemente FMB, Petiot GH, Coutinho D. Conditioned games: foundations, description, and types. In: Clemente FMB, editor. *Conditioned Games for Team Sports Training: Bridging the Gap from Theory to Practice*. 1 ed. Routledge; 2025. p. 34. <https://doi.org/10.4324/9781003506980>.
- [13] Côté J, Hancock DJ. Evidence-based policies for youth sport programmes. *Int J Sport Policy Polit* 2016;8(1):51–65.
- [14] Ng JY, Lonsdale C, Hodge K. The basic needs satisfaction in sport scale (BNSSS): instrument development and initial validity evidence. *Psychol Sport Exerc* 2011;12(3):257–64.
- [15] MacDonald DJ, Côté J, Eys M, Deakin J. Psychometric properties of the youth experience survey with young athletes. *Psychol Sport Exerc* 2012;13(3):332–40.
- [16] Roca A, Ford PR. Decision-making practice during coaching sessions in elite youth football across European countries. *Sci Med Footb* 2020;4(4):263–8.
- [17] Baethge C, Goldbeck-Wood S, Mertens S. SANRA—a scale for the quality assessment of narrative review articles. *Res Integr Peer Rev* 2019;4(1):5.
- [18] Petiot G.H., Nunes N.A., Silva D., Coutinho D., Aquino R. Exploring the integration, configuration, and implication of the design process of played-form practice in soccer based on ecological psychology. *Footb Stud*; 2025. 100003.

- [19] Hill-Haas SV, Dawson B, Impellizzeri FM, Coutts AJ. Physiology of small-sided games training in football: a systematic review. *Sports Med* 2011;41(3):199–220. <https://doi.org/10.2165/11539740-000000000-00000>.
- [20] Schöllhorn WI, Rizzi N, Slapsinskaitė-Dackevičienė A, Leite N. Always pay attention to which model of motor learning you are using. *Int J Environ Res Public Health* 2022;19(2):711.
- [21] Busse C, Kach AP, Wagner SM. Boundary conditions: what they are, how to explore them, why we need them, and when to consider them. *Organ Res Methods* 2017;20(4):574–609.
- [22] Sullivan MO, Woods CT, Vaughan J, Davids K. Towards a contemporary player learning in development framework for sports practitioners. *Int J Sports Sci Coach* 2021;16(5):1214–22.
- [23] Moy B, Renshaw I, Davids K. The impact of nonlinear pedagogy on physical education teacher education students' intrinsic motivation. *Phys Educ Sport Pedagog* 2016;21(5):517–38.
- [24] Kinnerk P, Kearney PE, Harvey S, Lyons M. An investigation of high-performance team sport coaches' planning practices. *Sports Coach Rev* 2023;12(3):253–80.
- [25] Collins D, Taylor J, Ashford M, Collins L. It depends coaching—the most fundamental, simple and complex principle or a mere copout? *Sports Coach Rev* 2026;15(1):25–45.
- [26] Woods CT, McKeown I, Rothwell M, Araújo D, Robertson S, Davids K. Sport practitioners as sport ecology designers: how ecological dynamics has progressively changed perceptions of skill “acquisition” in the sporting habitat. *Front Psychol* 2020;11:654.
- [27] Haeghe G, Komar J, Dicks M, Seifert L. Exploring to learn and learning to explore. *Psychol Res* 2021;85(4):1367–79. <https://doi.org/10.1007/s00426-020-01352-x>.
- [28] Balyi I, Way R, Higgs C. Long-term athlete development. *Hum Kinet* 2013.
- [29] McMorris T, Sproule J, MacGillivray WW, Lomax J. Cognitive development and performance of 11-, 13- and 15-year olds on a soccer-specific test of decision making. *Int J Sport Exerc Psychol* 2006;4(2):170–81. <https://doi.org/10.1080/1612197X.2006.9671791>.
- [30] Kelly AL, Williams CA. Physical characteristics and the talent identification and development processes in male youth soccer: a narrative review. *Strength Cond J* 2020;42(6):15–34.
- [31] Sweeney L, Lundberg TR. Relative age and biological maturity-related selection biases in male youth soccer across different competitive levels within a national association. *Sci Med Footb* 2025;9(3):328–36. <https://doi.org/10.1080/24733938.2024.2369543>.
- [32] Trainor LR, Budson A. Clarifying concepts: “well-being” in sport. *Front Sports Act Living* 2023;5:1256490.
- [33] Garner P, Roberts WM, Baker C, Côté J. Characteristics of a person-centred coaching approach. *Int J Sports Sci Coach* 2022;17(4):722–33.
- [34] Woods CT, McKeown I, Shuttleworth RJ, Davids K, Robertson S. Training programme designs in professional team sport: an ecological dynamics exemplar. *Hum Mov Sci* 2019;66:318–26.
- [35] Ayala V, Martínez-Bebia M, Latorre JA, Gimenez-Blasi N, Jimenez-Casquet MJ, Conde-Pipo J, et al. Influence of circadian rhythms on sports performance. *Chronobiol Int* 2021;38(11):1522–36.
- [36] Teoldo I, Guilherme J, Garganta J. Training football for smart playing: on tactical performance of teams and players. Editora Appris; 2017. (<https://books.google.ca/books?id=vyY0DwAAQBAJ>).
- [37] O'Connor D, Larkin P, Williams AM. Observations of youth football training: how do coaches structure training sessions for player development? *J Sports Sci* 2018; 36(1):39–47.
- [38] Rico-Gonzalez M, Pino-Ortega J, Praca GM, Clemente FM. Practical applications for designing soccer training tasks from multivariate data analysis: a systematic review emphasizing tactical training. *Percept Mot skills* 2022;129(3):892–931.
- [39] Petiot GH, Vitulano M, Davids K. The key role of context in team sports training: the value of played-form activities in practice designs for soccer. *Int J Sports Sci Coach* 2024;19(3):1262–74.
- [40] Nunes NA, Comber G, Petiot GH, Coley M. Analysis of the internal and external loads, and technical actions of small-sided games in soccer. *Insight-Sports Sci* 2024; 6(1):638. 638.
- [41] Petiot GH, Machado JC, Aquino R, Ribeiro J, Chow JY. Sport pedagogy in played-form practice in soccer: the articulation between contents and contexts. *Sports Coach Rev* 2024;1–20.
- [42] Hallé Petiot G, Vitulano M, Clemente FM, Davids K. The scope of intentionality supporting the design of played-form practice activities in soccer. *Int J Sport Exerc Psychol* 2025;1–27. <https://doi.org/10.1080/1612197X.2025.2584539>.
- [43] Côté J, Turnidge J, Murata A, McGuire C, Martin L. Youth sport research: describing the integrated dynamics elements of the personal assets framework. *Int J Sport Psychol* 2020;51(6):562–78.
- [44] Dowling M, Washington M. Epistemic communities and knowledge-based professional networks in sport policy and governance: a case study of the Canadian sport for life leadership team. *J Sport Manag* 2017;31(2):133–47.
- [45] Shilbury D, Phillips P, Karg A, Rowe K, Fajak H. Sport performance pathways. In: Sport management in Australia. Routledge; 2023. p. 202–23.
- [46] Côté J, Strachan L, Fraser-Thomas J. Participation, personal development, and performance through youth sport. In: Positive youth development through sport. Routledge; 2007. p. 48–60.
- [47] Davis B, Tu X, Georgan C, Danish JA, Enyedy N. The impact of different play activity designs on students' embodied learning. *Inf Learn Sci* 2019;120(9/10): 611–39.
- [48] Bruner MW, Balish SM, Forrest C, Brown S, Webber K, Gray E, et al. Ties that bond: youth sport as a vehicle for social identity and positive youth development. *Res Q Exerc Sport* 2017;88(2):209–14.
- [49] Collins L, Collins D. Professional judgement and decision-making in adventure sports coaching: the role of interaction. *J Sports Sci* 2016;34(13):1231–9.
- [50] Roca A, Pocock C, Ford PR. Exploring decision-making practices during coaching sessions in grassroots youth soccer: a mixed-methods study. *Sci Med Footb* 2025;9(4):361–8.
- [51] Collins L, Collins D. Integration of professional judgement and decision-making in high-level adventure sports coaching practice. *J Sports Sci* 2015;33(6):622–33.
- [52] Hertting K, Grahm K, Wagnsson S. Supportive communities: conceptualizing supportive structures for coaches' learning and well-being in community youth soccer. *Int J Environ Res Public Health* 2022;19(14):8249.
- [53] Taylor J, Ashford M, Jefferson M. High performance coach cognition in the wild: using applied cognitive task analysis for practical insights—cognitive challenges and curriculum knowledge. *Front Psychol* 2023;14:1154168.
- [54] Johnston K, Wang Y, Trace J, Baker J, Richard V, Roberts A. A Bayesian perspective on geographic influences in coach decision-making for athlete identification and selection. *Sci Rep* 2026.
- [55] Collins D, Collins L. Developing coaches' professional judgement and decision making: using the 'Big 5'. *J Sports Sci* 2021;39(1):115–9.
- [56] Koh KT, Santos F, Newman TJ. A self-directed online resource to enhance coach learning: a 21st-century approach to coach education. *Front Sports Act Living* 2025;7:1588636.
- [57] Farrokh D, Davids K, Araújo D, Strafford BW, Rumbold JL, Stone JA. Towards an ecological dynamics theory of flow in sport. *Acta Psychol* 2025;253:104765.
- [58] Petiot GH, Aquino R, Silva D, Barreira DV, Raab M. Contrasting learning psychology theories applied to the teaching-learning-training process of tactics in soccer. *Front Psychol* 2021.
- [59] Brito J, Krustup P, Rebelo A. The influence of the playing surface on the exercise intensity of small-sided recreational soccer games. *Human Mov Sci* 2012;31(4): 946–56.
- [60] Machado JC, Barreira D, Teoldo I, Serra-Olivares J, Góes A, Scaglia AJ. Tactical behaviour of youth soccer players: differences depending on task constraint modification, age and skill level. *J Human Kinet* 2020;75:225–38.
- [61] Woods CT, Rudd J, Robertson S, Davids K. Wayfinding: how ecological perspectives of navigating dynamic environments can enrich our understanding of the learner and the learning process in sport. *Sports Med - Open* 2020;6(1):51. <https://doi.org/10.1186/s40798-020-00280-9>.
- [62] Gibson JJ. The ecological approach to visual perception: classic edition. Psychology Press; 1979.
- [63] Chow JY, Button C, Lee MCY, Morris C, Shuttleworth R. Advice from “pracademics” of how to apply ecological dynamics theory to practice design. *Front Sports Act Living* 2023;5:1192332.
- [64] Werner P, Thorpe R, Bunker D. Teaching games for understanding: evolution of a model. *J Phys Educ Recreat Dance* 1996;67(1):28–33.
- [65] Kinnerk P, Harvey S, MacDonncha C, Lyons M. A review of the game-based approaches to coaching literature in competitive team sport settings. *Quest* 2018; 70(4):401–18.
- [66] Collier CS. Sport education models. In: Teaching games for understanding: theory, research, and practice, 137; 2005.
- [67] Bowles R, O'Dwyer A. Athlete-centred coaching: perspectives from the sideline. *Sports Coach Rev* 2020;9(3):231–52.
- [68] Teoldo I, Guilherme J, Garganta J. Football intelligence: training and tactics for soccer success. Routledge; 2021.
- [69] Chung D, Carvalho T, Casanova F, Silva P. Number of players manipulation effect on space and concentration principles of the game representativeness during football small-sided and conditioned games. *J Phys Educ Sport* 2019;19:381–6.
- [70] Couto BP, Praça GM, Gabbett TJ, Luchesi MS, Oliveira MP, Sayers MG. The influence of the field orientation on the representativeness of the positional dynamics in soccer small-sided games. *Int J Sports Sci Coach* 2024;19(4):1680–7.
- [71] Olthof SB, Frencken WG, Lemmink KA. A match-derived relative pitch area facilitates the tactical representativeness of small-sided games for the official soccer match. *J Strength Cond Res* 2019;33(2):523–30.
- [72] Travassos B, Duarte R, Vilar L, Davids K, Araújo D. Practice task design in team sports: representativeness enhanced by increasing opportunities for action. *J Sports Sci* 2012;30(13):1447–54. <https://doi.org/10.1080/02640414.2012.712716>.
- [73] Csikszentmihalyi M. The Psychology of Optimal Experience. First edition. Harper & Row; 1990.
- [74] Brown T. Change by design: how design thinking transforms organizations and inspires innovation. HarperCollins; 2009. (<https://books.google.ca/books?id=x7PjWyVUoVAC>).
- [75] Brown T, Katz B. Change by design. *J Product Innov Manag* 2011;28(3):381–3.
- [76] O'Sullivan M, Vaughan J, Woods CT, Davids K. There is no copy and paste, but there is resonance and inhabitation: integrating a contemporary player development framework in football from a complexity sciences perspective. *J Sports Sci* 2023;1–10.
- [77] Kolar E, Biloslavo R, Pišot R, Veličković S, Tušak M. Conceptual framework of coaches' decision-making in conventional sports. *Front Psychol* 2025;15:1498186.
- [78] Krolikowski KA, Bi M, Baggott CM, Khorzad R, Holl JL, Kruser JM. Design thinking to improve healthcare delivery in the intensive care unit: promise, pitfalls, and lessons learned. *J Crit Care* 2022;69:153999.
- [79] Bergmann F, Gray R, Wachsmuth S, Höner O. Perceptual-motor and perceptual-cognitive skill acquisition in soccer: a systematic review on the influence of practice design and coaching behavior. *Front Psychol* 2021;12:772201.
- [80] Stodter A, Whitehead A. Thinking again about the use of think aloud and stimulated recall methods in sport coaching. *Qual Res Sport Exerc Health* 2024;16(5):456–70.