2022, *Retos, 45,* 566-575

Promoting tactical-technical actions during small-sided soccer games: A narrative review on constraints' manipulation within ecological teaching models

Promoción de acciones técnico-tácticas durante partidos de fútbol reducidos: una revisión narrativa sobre la manipulación de restricciones dentro de modelos de enseñanza ecológicos

*Eduardo de Paula Amorim Borges, **Gibson Moreira Praça, ***Lucas Savassi Figueiredo, *Carlos Alexandre Vieira, *Gustavo De Conti Teixeira Costa

*Universidade Federal de Goiás (Brasil), **Universidade Federal de Minas Gerais (Brasil), *** Brazilian Air Force (Brasil)

Abstract. Aiming to improve the players' performance in soccer, coaches and teachers have been employing contemporary training methods, which include the use of small-sided games. These games are pedagogical tools used in training sessions to improve the players' tactical, technical, physical and psychological skills in environments that are similar to the formal game. The use of small-sided games has advantages in the soccer teaching-learning-training process, as long as the coach comprehends which game variables should be manipulated to achieve his/her goals. In this regard, this narrative review aimed to present and discuss the manipulation of some aspects that influence the tactical-technical modulation in small-sided soccer games. The effectiveness of small-sided games as pedagogical tools depends on its multiple configurations, such as the composition of teams, the number of players per team, the size of the pitch and the manipulation of the game rules. These game configurations must be aligned with the goals of the coach and the team, and meet the athletes' ability to solve problem-situations, based on their tactical-technical knowledge.
Keywords: Teaching Models, Training, Performance, Game Ecology, Small-sided Games.

Abstracto. Con el objetivo de mejorar el rendimiento de los jugadores en el fútbol, los entrenadores y profesores han estado empleando métodos de entrenamiento contemporáneos, que incluyen el uso de juegos reducidos. Estos juegos son herramientas pedagógicas que se utilizan en las sesiones de entrenamiento para mejorar las habilidades tácticas, técnicas, físicas y psicológicas de los jugadores en entornos similares al juego formal. El uso de juegos reducidos tiene el potencial de brindar ventajas en el proceso de enseñanza-aprendizaje-entrenamiento del fútbol, siempre que el entrenador comprenda qué variables del juego se deben manipular para lograr sus objetivos. En este sentido, esta revisión narrativa tuvo como objetivo presentar y discutir la manipulación de algunos aspectos que influyen en la modulación táctico-técnica en partidos de fútbol reducidos. La efectividad de los juegos reducidos como herramientas pedagógicas depende de sus múltiples configuraciones, como la composición de los equipos, el número de jugadores por equipo, el tamaño del campo y la manipulación de las reglas del juego. Estas configuraciones de juego deben estar alineadas con los objetivos del entrenador y del equipo, además de cumplir con la capacidad de los atletas para resolver situaciones-problemas, de acuerdo con sus conocimientos táctico-técnicos.
Palabras clave: Modelos de enseñanza, Entrenamiento, Desempeño, Ecología de juegos, Juegos reducidos.

Introduction

Soccer is a collective sport that encompasses several models, conceptions and concepts (Andrade, et al., 2018). From the sports science perspective, the game is understood as a complex system and the success of actions is not the result of the sum of each athlete's characteristics, but it results from the relationship established between the components of this system (Robertson, et al., 2019). In other words, the individual level of performance does not represent the team's success, since high levels of cooperative behavior between teammates are necessary to achieve success in soccer (Da Silva, et al., 2018). In this respect, the analyses of sports groups are critical because they consider the interdependent relationships between individuals in the sport context, which are likely to influence the group's functioning, performance, affective experience and adherence (Evans & Eys, 2015). Regardless of the methodology or pedagogical concept that underlies the didactics applied in practice, the goal is always the quantitative and qualitative improvement of the team (Andrade, et al., 2018). Specifically, the development of competences respecting the essence of the game involves the inclusion of the decisional demands and contextual characteristics of the game in the training process, which reinforces the pedagogical relevance of small-sided games (SSGs) in modern soccer training.

Fecha recepción: 19-10-21. Fecha de aceptación: 29-03-22
Gustavo De Conti Teixeira Costa
conti02@ufg.br

The emergence of performance in soccer depends not only on the cooperation between the team members, but also on the employment of the athletes' maximum performance in tactical, technical, psychological and physical skills, in a tactical-situational context (Galatti, et al., 2017; Santos & Souza, 2018). Accordingly, soccer training should also embrace the development of athletes' tactical aspects, including the perception of changes in the game and decision-making under unpredictable contexts (Moreira, et al., 2017). Indeed, the new perspectives on sports training, here with a specific focus on soccer, highlight the need for coaches and athletes to turn their attention beyond the technical aspects. Training should also include tactical training, as this develops the ability of athletes to adapt their behaviors depending on the different contexts of the game (Batista, et al., 2018).

Optimal training sessions should be planned and executed to favor the teaching-learning-training process of essential aspects of soccer practice, such as those of tactical, technical, psychological and physical nature (Praça, et al., 2017). While the mechanistic models propose the decontextualized teaching of technique, new models for sports teaching propose a more integrated methodology of the teaching process. Accordingly, these models aim to provide athletes with opportunities for technical development incorporated with tactical and socio-affective development, which are also crucial for soccer players (Galatti, et al., 2017; Praça, et al., 2016). In the next section, we will address some of the contemporary teaching models that have been influencing the soccer training.

Pedagogical models

Among the teaching models that diverge from the traditional pedagogical approach of direct instruction are the Sport Education, the Teaching Games for Understanding, the Non-Linear Pedagogy and the Invasion Games Competence Model. These pedagogical models address the configuration of SSGs in training as well as instruction and learning strategies in team sports (Andrade, et al., 2018; Gallati, et al., 2017).

The Sport Education Model (SEM) was proposed by Siedentop in the 1980s, in the North American context, aiming at cooperative and inclusive learning (Siedentop, 1994, 1998). This model is based on three fundamental propositions, in which the learner should: 1) master contents that allow him to be part of the game; 2) know, participate and reflect on sports traditions and rituals; and 3) feel attracted to the sport, recognizing the conditions in which he/she finds himself/herself (Romão, et al., 2018). These goals would be accomplished through the experience obtained in diverse sports seasons, in which students are actively engaged in different roles such as manager, coach and player. Research investigating the efficiency of the SEM in children and adolescents found that this model provides enthusiasm and improvement in student-coaches' leadership skills and instructional competence (Araújo, 2017), increased perception of personal and social responsibility (Bessa, et al., 2017), improved decision-making ability and tactical-technical skills (Del Campo, 2014; Hastie & Trost, 2002), and increased perception of proficiency in the tactical-technical performance of the game (Gouveia, et al., 2020). As we have seen, evidence suggests that this pedagogical model provides learners with more knowledge of the sport and genuine perceptions of learning, fostering the tactical-technical improvement through small-sided games that represent the formal game demands.

The Teaching Games For Understanding (TGfU) was proposed by Bunker and Thorpe in 1982, and provided an important paradigm shift, allowing the mechanistic perspective of training to be overcome. TGfU provides an interface in which the teacher helps students to establish connections between the game's purposes and the modified forms of the game (Bunker & Thorpe, 1982). The model seeks to develop the learners' ability to perceive relevant signals, its strategic ability and the ability to execute movements based on an adequate analysis of the context (Galatti, et al., 2017; Morales-Belando, et al., 2018). The TGfU generates long-term memory adaptations that improved the quality of tactical knowledge at three levels of analysis (conceptual content, conceptual sophistication, and conceptual structure) (Harvey, et al., 2020), improving players' tactical awareness (Osman, 2017). Evidence suggests that training sessions based on TGfU induced greater participation in sports, increased motivation, higher performance on the sports activities (Alcalá & Garijo, 2017), and even better academic results when compared to students that experienced classes based on a traditional mechanistic approach (Mandigo, et al., 2019). Overall, TGfU, which uses small-sided games as a pedagogical means of teaching, can contribute to the tactical-technical learning and promote gains in cognitive skills and psychometric variables, such as motivation for practice.

The Non-Linear Pedagogy (NLP) model is based on the acquisition of skills from the interactions established

by the learners, determined by the constraints of the task and the environment. Chow et al. (2015) proposes that players can be considered non-linear systems, since a small modification in task constraints can influence large changes in game patterns, generating multiple behavioral effects and diverse solutions to game problems. Therefore, the manipulation of task constraints encourages players to explore multiple action possibilities (affordances). The trainer must propose tasks that are representative of the formal context, establishing an information-action coupling, so that learning is effective (Chow, et al., 2015). The coach must propose constraining situations that involve tactical problems and require the execution of varied movements, which encourages the acquisition of both new behavior and movement patterns (Chow, et al., 2015; Serra-Olivares & Garcia-Rubio, 2017).

The NLP presents the following principles: (1) representative learning design - the coach must create tasks that simulate the competitive context; (2) information-action coupling - through the use of representative tasks, players are encouraged to establish a functional information-action coupling; (3) manipulation of constraints - through the manipulation of constraints, the coach will be able to emphasize specific tactical problems and stimulate the acquisition of new behavior patterns by players; (4) exploratory learning - movement variability stimulates exploratory activities and guides players to discover individualized and functional solutions to specific game problems; and (5) reduction of conscious movement control - the coach should avoid directing players' attention to possible pre-established responses to game problems, allowing these athletes more autonomy to explore the environment in search of meaningful solutions to them (Chow, et al., 2013; Chow, et al., 2015; Serra-Olivares & Garcia-Rubio, 2017).

Research investigating the application of NLP in soccer training demonstrated that students might explore and discover individualized kick patterns when challenged, without technical instructions (Chow, et al., 2008). Moreover, exploration in learning allowed learners to establish associations between technical movement patterns (kicking the ball) and the performance context (ball trajectory). Similarly, Schollhorn et al. (2012) reported significant advantages of the NLP model in the learning of technical movements, such as ball control and shooting at a goal tasks, compared to a traditional repetition-oriented approach. Furthermore, Chow et al. (2015) conducted a systematic review in which benefits of the NLP model were found in primary education classes, such as the development of technical skills and game comprehension. The aforementioned results reinforce the notion that learning is context-dependent, and that variations in training activities must be proposed individually, since each player will respond differently to the situation-problems imposed. From the perspective of NLP, small-sided games are important pedagogical tools that coaches should emphasize in training, as they provide multiple action possibilities and interaction between the player, their peers and the goals of the game.

The Invasion Games Competence Model (IGCM) was developed in Belgium, by Musch et al. (2002), and is characterized as a hybrid model of the SEM and the TGfU. This model is based on the proposition of simple exercise configurations with the purpose of improving the execution of the players' tactical-technical skills according to the game's objectives (Musch, et al., 2002). Teachers/coaches take direct measures so that the students/athletes direct their attention to the elements and objectives of the game, generating a diagnosis of their difficulties and providing active support to their learning efforts (Gil-Arias, et al., 2017; Graça, et al., 2019). Research investigating the application of IGCM indicated that interventions based on this model increased the responsibility and autonomy of students, increased the level of their skills execution, tactical decision-making and the involvement in the game (Quintal, et al., 2018). Furthermore evidence suggests that this model led to increased motor commitment times and improvements in the ability to solve tactical problems (Caldeira, et al., 2019), and to improving the students' perception of autonomy, competence and satisfaction (Gil-arias, et al., 2017). Therefore, it seems that IGCM provides opportunities for development of socio-affective skills, and tactical-technical learning, which converges to the intended interface between SEM and TGfU.

In summary, findings suggest that the different teaching models mentioned above are effective in the teaching-learning-training process. Even so, there are limitations associated with each of these models. For example, the SEM raises the level of commitment to the game and improves athletes' motor skills, but the students' lack of knowledge and leadership may act as a limiting factor (Soares & Antunes, 2016). The TGfU model contributes to the development of motivation and tactical reasoning, but it still presents a superficial approach in the division of tactical and technical

development (Gouveia, et al., 2020; Mesquita, et al., 2009). The NLP, in turn, favors the development of technical skills and understanding of the game (Chow, et al., 2015), but requires high levels of knowledge from coaches to help athletes develop in the face of manipulated constraints (Clemente, 2012). Finally, the IGCM model improves tactical decisions and the involvement of students in the game, but few studies investigated the impact of this model on effective learning. As we have seen, all models have benefits and limitations, which make us believe that the teacher/coach should base his/her practice on the model that is most appropriate to the real conditions of the teaching-learning-training, keeping in mind that it is possible to apply different pedagogical approaches throughout the sporting season.

Pedagogical approaches and SSGs

All the aforementioned pedagogical models use the small-sided games as an environment that promotes tactical learning. These games are pedagogical tools that facilitate the transfer of the skills developed in training sessions to the competition, given the similarity between these contexts.

The use of SSGs within teaching models allow the coach to set up game contexts that meet the needs present in different stages of player training. This may achieved by proposing situations that stimulate players to constantly evaluate, create, predict and make decisions regarding team skills, with and without possession of the ball, either in the teaching-learning-training environment or in the formal game (Gallati, et al., 2017; Travassos, et al., 2014). For example, the application of the SEM can be favored by SSGs through the succession of tournaments in different configurations (1vs.1; 2vs2. 3vs.3, etc.). These games provide players enough time to improve technical capacity and develop a cooperative and tactical awareness, respecting the specificity of each student (Garganta, et al., 2013). In the application of the TGfU, SSGs are used due to their structural and tactical similarities to the formal game. This makes it possible to develop the players' ability in situations where the level of complexity of the tactical problems and required motor actions are compatible with players' competences (Garganta, et al., 2013). Therefore, training based on SSGs allows manipulating the degree of complexity of the tasks, delimiting the restrictions (constraints) to the development of the game and integrating technical and tactical aspects (Bravo & Oliveira, 2016; Santos & Souza, 2018). Furthermore, the combination of IGCM with SSGs allows players to develop the ability to work as a team, make tactical decisions and execute the appropriate technique to specific contexts of the game. To this extent, SSGs provide a context for the application and assessment of learning and enable the development of socio-affective, cognitive, and motor domains (Bravo & Oliveira, 2016; Garganta, et al., 2013).

Systematic training based on methodologies that use SSGs is capable of improving technical (Clemente & Sarmento, 2020), tactical (Clemente, et al., 2020), physical and psychological (Sarmento, et al., 2014) skills, while taking into account the random changes and the complexity of the actions that are inherent to the sport (Andrade, et al., 2018). This reinforces the need to reduce the use of mechanistic and decontextualized training models. Alternatively, priority should be placed on training models that emphasize the unpredictability and similarity with the real game, favoring the development of athletes that are able to respond to the ever-changing demands of the game.

In this respect, SSGs games are characterized by a context of opposition-cooperation similar to the formal game, in which tactical knowledge potentiates the interactions between players. This is particularly relevant, considering that:

In soccer training, the maximum benefits of exercise are obtained when the training stimuli are similar to the competitive demands generated by the activity, in this case the game itself. Within this context, small-sided games (SSGs) have been proposed with the objective to replicate the demands of a game and to train in an integrated manner the technical, tactical, physical, physiological and psychological components of soccer performance (Praça, et al., 2015, p. 270).

Therefore, athletes must employ a tactical-cognitive awareness for the various situations experienced in small-sided games, performing appropriate actions with adequate effort intensities, and adjusting their movements to the demands imposed by the task (Batista, et al., 2019). However, for athletes to obtain the proposed benefits, the coach must have an adequate knowledge of the teaching method used and of the game variables manipulated, based on the specific goals of the tasks (Santos & Souza, 2018).

It is the coach/teacher role to identify the characteristics of the players and define the more relevant skills to develop in training (Batista, et al., 2018; Chaves & Da Silva, 2020). Based on this information,

several variables can be manipulated in the application of the SSGs, such as the composition of teams, the number of players per team, the size of the pitch, the use of specific rules, the use of goalkeepers or not and the coach's verbal encouragement (Correa, et al., 2019; Sarmento, et al., 2018). By modifying the SSGs configurations, it is possible to meet the different aspects of tactical, technical and physical skills development. The specific effects of some of these manipulations will be addressed below.

Technical and tactical aspects in small-sided soccer games

The manipulation of game variables in SSGs aims to direct athletes toward specific aspects of tactical-technical skills development. One of these variables is the number of players, which seems to affect the frequency of tactical-technical actions performed by athletes. For instance, Clemente et al. (2019) found that as the number of players reduces, the number of contacts with the ball and technical actions, such as passing, dribbling and kicking, become more frequent. Similarly, Castelão et al. (2014) demonstrated that games with a reduced number of players demanded more penetration and delay actions, compared to games with more players, where the offensive unity and balance actions were more required. In another study, Praça et al. (2018) observed that, during SSGs practiced in numerical superiority, players showed an increase incidence of tactical actions without the ball, namely coverage and unity (offensive and defensive), and depth mobility. These facts corroborate previous findings showing a higher incidence of unity (offensive and defensive), defensive coverage and balance actions (Praça, et al., 2016). Praça et al. (2015) also showed that the ball circulation and expansion of the effective game space were alternatives to overcome tight defenses, and defenses close to their own goals in numerical superiority SSGs.

The size and format of the pitch in SSGs also affect the tactical-technical actions performed by players. Specifically, SSGs played in smaller dimensions favor the occurrence of ball control, dribbling and shooting actions, as well as interceptions, ball repositions and number of passes performed by goalkeepers (Jara, et al., 2019). On the other hand, as the dimensions of the pitch increase in SSGs, tactical principles such as penetration, defensive balance and defense unity become more frequent (Sarmento, et al., 2018), and the periods in which teams retain possession of the ball become longer (Olthof, et al., 2018). Moreover, larger pitch sizes imply greater area covered by teams, which influences the players' perception of space, conditioning its occupation and use, as well as the distances between players and their interactions (Serra-Olivares, et al., 2015).

The manipulation of specific rules in SSGs has also been in the interest of researchers. For instance, Clemente and Mendes (2015) observed that when the «possession of the ball for as long as possible» was defined as a rule, players made more contact with the ball and performed more short passes. In another study, Almeida, Ferreira and Volossovitch (2012) stipulated the rules of «four passes to score» or «maximum of two ball touches per individual possession» in a 3v3 game with goalkeepers, and identified that players performed more offensive sequences, and faster passes and attacks. Likewise, Machado et al. (2016) found that awarding extra points to the team that performed «five passes without returning the ball to the player who just made the pass» resulted in longer offensive sequences and more contacts with the ball.

Other studies have focused on analyzing the differences in SSGs based on the presence or absence of goalkeepers in these games. The inclusion of goalkeepers tends to increase the number of shooting actions performed by outfield players (Mallo & Navaro, 2008), as well as decrease the number of passes and technical errors performed by these players (Rebelo, et al., 2011). Furthermore, Dellal et al. (2008) demonstrated that games played with goalkeepers decrease the frequency of actions with the ball and probably modify the tactical behavior of the outfield players, since it is necessary to modulate offensive behavior to break the defense of the opposing team and the goalkeeper to score the goal.

Batista et al. (2019) observed that, when the coach provided defensive strategy instructions, players performed more defensive actions, covered less space, and more distance in jogging compared to players that did not receive instructions. On the other hand, when the coach provided offensive strategy instructions, players performed more passes per ball possession, showed larger team length, and covered larger space and more distance in jogging. Furthermore, evidence indicated that the active participation of the coach, verbally encouraging and instructing the athletes, could improve their problem-solving abilities, both in terms of pitch positioning and in resolving problems created by the opponents during games (Pasquarelli, et al., 2013). Research on the effects of coaches' verbal

encouragement and guidance on the tactical-technical performance of soccer players is still scarce, but, overall, evidence shows that tactical and strategic instructions favor the development of players' tactical behavior and the functional performance of the team (Batista, et al., 2019).

Praça et al. (2016) observed that SSGs with an additional player on the pitch promoted greater ball circulation and expansion of the effective playing space, resulting in increased width and depth values in the 4vs.3 configuration. In the 3vs.3+2 configuration authors found that additional players allowed reaching the opponent's goal faster, encouraged the game in depth, and increased the value of the depth/width ratio. In SSGs, coaches can also promote variability in training tasks by using different balls to develop players' adaptive movement behaviors. In this regard, Santos et al. (2020) observed that the use of handball and rugby balls in training (6vs6) decreased the number of successful passes and feints performed by players, and decreased game space and total distance covered by them.

The scoring method may also affect player behavior. Lorenzo-Martínez et al. (2020) observed greater total distance covered by players in SSGs (4vs4) when the result was a draw, compared to losses or wins. Praça et al. (2021) also observed that increasing the size of the pitch restricts the behavior of players during SSGs, as they identified higher values of spatial exploration index and stretching index of players on the pitch.

Soccer athletes can be classified as goalkeepers, defenders, midfielders and forwards (Da Silva, et al., 2018), and playing in each of these positions represent distinct demands and goals. One could expect that the playing position of players in SSGs affects the action opportunities that emerge during these games. This is because each player has experiences that are inherent to his/her playing position, which results in different knowledge structures and tactical responses performed on the field (Braga Silva, et al., 2018).

Evidence supports the notion that playing position interferes with players' behavior in SSGs. To illustrate, Da Silva et al. (2018) found that defenders carry out more direct opposition and goal protection actions, and increased pressure in the center of play compared to forwards. On the other hand, the midfielders performed more actions behind the last opposing defender compared to the defenders. Athletes from different positions show different movement patterns, which demonstrated that constraints of tactical nature interfere in the technical response of soccer players. A systematic review by Sarmento et al. (2014) investigated the players' responses to problem-situations based on the athletes' previous experience and the specificity of playing position. Several 3 vs 3 SSGs were analyzed, with teams composed by a defender, a midfielder and a forward. Results suggested that players tactically performed under similar conditions than those normally associated with the demands of each playing position in full-sized games. In another investigation, Praça et al. (2016) demonstrated that SSGs in which teams are composed of players of the same positional status (i.e., 3 vs 3 game in which all players are originally defenders) provide greater variability, since this game configuration requires from the athletes actions that are different from the ones performed in their original playing positions. Specifically, in this example defenders must actively participate in the offensive and defensive phases of the game, experiencing new tactical-technical challenges. It is noteworthy, however, that even among defenders there are playing positions with different functions, such as central or external defenders, which represent different demands to the players. Further investigation on the influence of different variables of positional status (e.g., central defenders, external defenders, central midfielders, external midfielders, etc.) on tactical-technical behavior in SSGs is necessary.

All things considered, it is clear that SSGs are useful pedagogical tools in the development of athletes, as they promote increases in performance that are specific to the game configurations used during training sessions. In this scenario, the reduction and simplification of the formal game (11 vs 11) allows athletes to be confronted with tactical problems more frequently, and promotes more active participation and increased contact time with the ball. However, the results on tactical behavior in SSGs are still limited and further research is needed, according to a systematic review conducted by Clemente et al. (2021). To overcome this limitation, these authors suggested the use of interventions with external validity, as well as the appropriate instruments to assess tactical aspects. Despite the indications that SSGs are capable of induce changes in tactical-technical-physical aspects (Batista, et al., 2019; Clemente, et al., 2019; Jara, et al., 2019), it is still necessary to produce more evidence by exploring a greater diversity of SSGs configurations. This would allow a better understanding of the effects of these variables and their applications, especially in relation to the development of tactical aspects in soccer athletes.

Practical implications

In short, it is evident that the effectiveness of SSGs depends on its configurations and on the goals stipulated by the coach. For instance, when coaches aim to develop the players' technical aspects, such as passing and dribbling, they should employ SSGs with fewer players. On the other hand, to increase the number of ball contacts per individual possession, coaches should employ SSGs where the maintenance of possession of the ball represents the goal of the game. When coaches are interested in improving the quantity and quality of tactical actions, they should employ SSGs in larger areas or with the presence of a goalkeeper, to increase offensive actions towards the goal.

SSGs limitations

Despite the high applicability of SSGs, it is essential that the coach/teacher has adequate knowledge about this pedagogical tool, so that he can perform relevant task manipulations and organize an ideal training structure for the development of players (Chow, et al., 2015). Additionally, it is necessary to point out some of SSGs limitations, such as the possibility of higher incidence of physical injuries during training due to increased contact between players, the difficulty to control the intensity of the games, and the need for technology to quantify the training workload (Little, et al., 2009). SSGs also require a certain degree of technical skills and tactical knowledge from athletes (Clemente & Sarmento, 2020), and task restrictions can limit game flow and decrease the success of sport-specific actions (Little, et al., 2009; Garganta, et al., 2013). Lastly, there is a limitation of SSGs for improving physical conditioning, as athletes with a high level of physical performance may not reach maximum intensity during these games (Clemente, et al., 2021).

Final considerations

The design and application of exercises for teaching-learning-training soccer changed over time, and contemporary teaching methods began to consider the multiple capabilities of players to achieve the desired effectiveness in the implementation of training methods. From this perspective, the use of small-sided games is a viable way to develop the game capacity along with the optimization of tactical skills. Such games can be configured in different ways, with different pitch sizes, number of players, specific rules or even the stimulation of specific behaviors towards a certain goal. The multiplicity of SSGs must take into account the specificities of the modality, so that characteristics such as unpredictability and complexity that are inherent to the sport are present at all times.

References

Alcalá, D. H., & Garijo, A. H. (2017). Teaching games for understanding: A comprehensive approach to promote student's motivation in physical education. *Journal of Human Kinetics, 59*, 17-27.

Almeida, C. H., Ferreira, A. P., & Volossovitch, A. (2012). Manipulating task constraints in small-sided soccer games: Performance analysis and practical implications. *The Open Sports Science Journal*, *5*(1), 174-180.

Andrade, H., Gouveia, É., Nóbrega, M., & Lopes, H. (2018). *Abordagens alternativas ao Ensino dos Jogos Desportivos Coletivos de Invasão na Educação Física–uma abordagem no futebol.* In: Lopes, H., Gouveia, E., Rodrigues, A., Correia, A. L., Simões, J., & Alves, R. Didática da educação física: perspectivas, interrogações e alternativas. Portugal: Universidade de Madeira.

Araújo, R. (2017). A aprendizagem dos alunos e as dinâmicas operantes no seio das equipas no Modelo de Educação Desportiva: Evidências da investigação e direções futuras. *Revista Portuguesa de Ciências do Desporto*, *17*(S1), 39-49.

Batista, B., Cunha, F., Clemente, F., Sousa, P. M., Pinheiro, V., & Santos, F. J. (2018). A percepção dos treinadores de Futebol sobre os jogos reduzidos condicionados no processo de treino. *RBFF-Revista Brasileira de Futsal e Futebol*, *10*(39), 411-420.

Batista, J., Goncalves, B., Sampaio, J., Castro, J., Abade, E., & Travassos, B. (2019). The influence of coaches' instruction on technical actions, tactical behaviour, and external workload in football small-sided games. *Montenegrin Journal of Sports Science and Medicine*, *8*(1), 29-36.

Bessa, C., Silva, R., Rosado, A., & Mesquita, I. (2017). Impacto dos modelos de Educação Desportiva e Instrução Direta no desenvolvimento da responsabilidade pessoal e social em jogos desportivos. *Revista Portuguesa de Ciências do Desporto*, *17*(S1), 66-74.

Braga Silva, R. N. B., Teoldo, I., da Silva, D. C., Ferreira, L. A., & Dos-Santos, J. W. (2018). Influência do esta-

tuto posicional sobre o comportamento tático de jogadores de futebol. *Pensar a Prática*, *21*(3), 672-682.

Bravo, L., & Oliveira, M. T. (2016). Comportamentos táticos no jogo de futsal: os princípios do jogo. *Millenium-Journal of Education, Technologies, and Health*, 42, 127-142.

Bunker, D., & Thorpe, R. (1982). A model for the teaching of games in secondary schools. *Bulletin of physical education*, *18*(1), 5-8.

Caldeira, R., Freitas, R., Gaspar, A., Oliveira, R., Sousa, H., Pestana, M., & Gouveia, É. R. (2019). *O Impacto do Modelo de Competência na Aprendizagem dos Jogos de Invasão: um Estudo Experimental no Contexto Escolar*. In: Lopes, H., Rodrigues, A., Gouveia, É., Correia, A. L., & Alves, R. A Educação Física em tempos de mudança: Ferramentas Didáticas. Portugal: Universidade da Madeira.

Castelão, D., Garganta, J., Santos, R., & Teoldo, I. (2014). Comparison of tactical behaviour and performance of youth soccer players in 3v3 and 5v5 small-sided games. *International Journal of Performance Analysis in Sport*, *14*(3), 801-813.

Chaves, P. H. T., & da Silva, J. K. R. M. (2020). Treinamento de futebol: a influência dos jogos reduzidos e condicionados no processo deaprendizagem do jogador de futebol» uma revisão da literatura. *Revista Brasileira de Futebol (The Brazilian Journal of Soccer Science)*, *12*(2), 57-73.

Chow, J. Y. (2013). Nonlinear learning underpinning pedagogy: evidence, challenges, and implications. *Quest*, *65*(4), 469-484.

Chow, J. Y., Davids, K., Button, C., & Rein, R. (2008). Dynamics of movement patterning in learning a discrete multiarticular action. *Motor control*, *12*(3), 219-240.

Chow, J. Y., Davids, K., Button, C., & Renshaw, I. (2015). *Nonlinear pedagogy in skill acquisition: An introduction*. London: Routledge.

Clemente, F. M. (2012). Princípios pedagógicos dos teaching games for understanding e da pedagogia não-linear no ensino da educação física. *Movimento (ESEFID/UFRGS)*, *18*(2), 315-335.

Clemente, F. M., & Sarmento, H. (2020). The effects of small-sided soccer games on technical actions and skills: A systematic review. *Hum. Mov*, *21*, 100-119.

Clemente, F. M., & Sarmento, H. (2020). The effects of small-sided soccer games on technical actions and skills: A systematic review. *Human Movement*, *21*(3), 100-119.

Clemente, F. M., Afonso, J., Castillo, D., Los Arcos, A., Silva, A. F., & Sarmento, H. (2020). The effects of small-sided soccer games on tactical behavior and collective dynamics: A systematic review. *Chaos, Solitons & Fractals*, *134*, 109710.

Clemente, F. M., Ramirez-Campillo, R., Sarmento, H., Praça, G. M., Afonso, J., Silva, A. F., ... & Knechtle, B. (2021). Effects of Small-Sided Game Interventions on the Technical Execution and Tactical Behaviors of Young and Youth Team Sports Players: A Systematic Review and Meta-Analysis. *Frontiers in Psychology*, *12*, 1-13.

Clemente, F. M., Sarmento, H., Costa, I. T., Enes, A. R., & Lima, R. (2019). Variability of technical actions during small sided games in young soccer players. *Journal of Human Kinetics*, *69*, 201-212.

Clemente, F., & Mendes, R. (2015). *Treinar jogando–Jogos Reduzidos e Condicionados no Futebol*. Estoril: Primebooks.

Correa, P. H. F., Silva, M. V., Guimarães, J. P. A., Greco, P. J., & Praça, G. M. (2019). Comparação de resposta da frequência cardíaca em pequenos jogos no futebol com diferentes critérios de composição das equipes. *RBFF-Revista Brasileira de Futsal e Futebol*, *11*(43), 223-228.

Da Silva, R. N. B., Teoldo, I., da Silva, D. C., Ferreira, L. A., & Dos-Santos, J. W. (2018). Influência do estatuto posicional sobre o comportamento tático de jogadores de futebol. *Pensar a Prática*, *21*(3), 672-682.

Del Campo, D., García López, L. M., Chaparro Jilete, R., & Fernández Sánchez, A. J. (2014). Aplicación del modelo de Educación Deportiva en segundo de Educación Primaria: percepciones del alumnado y el profesorado. *Cuadernos de Psicología del Deporte*, *14*(2), 131-144.

Dellal, A., Chamari, K., Pintus, A., Girard, O., Cotte, T., & Keller, D. (2008). Heart rate responses during small-sided games and short intermittent running training in elite soccer players: a comparative study. *The Journal of Strength & Conditioning Research*, *22*(5), 1449-1457.

Evans, M. B., & Eys, M. A. (2015). Collective goals and shared tasks: interdependence structure and perceptions of individual sport team environments. *Scandinavian Journal of Medicine & Science in Sports*, *25*(1), e139-e148.

Galatti, L. R., Bettega, O. B., Paes, R. R., Reverdito, R. S., Seoane, A. M., & Scaglia, A. J. (2017). O ensino dos jogos esportivos coletivos: avanços metodológicos dos aspectos estratégico-tático-técnicos. *Pensar a prática*, *20*(3), 639-654.

Garganta, J., Guilherme, J., Barreira, D., Brito, J. & Rebelo, A. (2013). *Fundamentos e práticas para o ensino e treino do futebol.* In F. Tavares (Ed.), Jogos Desportivos Coletivos. Ensinar a jogar (pp. 199-263). Porto: Editora FADEUP.

Gil-Arias, A., Harvey, S., Cárceles, A., Práxedes, A., & Del Villar, F. (2017). Impact of a hybrid TGfU-Sport Education unit on student motivation in physical education. *PloS one*, *12*(6), e0179876.

Gouveia, É. R., Lopes, H., Rodrigues, A., Quintal, T., Pestana, M., Alves, R., ... & Ihle, A. (2020). *O modelo de educação desportiva: uma alternativa a considerar no ensino da educação física*. In: Duarte, A. C., & Cristovão, N. Educação, artes, cultura: discursos e práticas. Funchal: Centro de Investigação em Educação.

Graça, A., Musch, E., Mertens, B., Timmers, E., Mertens, T., Taborsky, F., ... & Vonderlynck, V. (2019). *O modelo de competência nos jogos de invasão: proposta metodológica para o ensino e aprendizagem dos jogos desportivos.* In: Godoy, S. J. I., Feu, S., & García-Rubio, J. Los procesos de formación y rendimiento en Baloncesto: Progresos científicos para su mejora. Sevilha: *Wanceulen Editorial* Desportivo.

Harvey, S., Gil-Arias, A., & Claver, F. (2020). Effects of Teaching Games for Understanding on tactical knowledge development in middle school physical education. *Journal of Physical Education and Sport*, *20*(3), 1369-1379.

Hastie, P. A., & Trost, S. G. (2002). Student physical activity levels during a season of sport education. *Pediatric Exercise Science*, *14*(1), 64-74.

Jara, D., Ortega, E., Gómez-Ruano, M. Á., Weigelt, M., Nikolic, B., & Sainz de Baranda, P. (2019). Physical and Tactical Demands of the Goalkeeper in Football in Different Small-Sided Games. *Sensors*, *19*(16), 3605.

Little T. (2009). Optimizing the use of soccer drills for physiological development. St*rength and Conditioning Journal*, *31*(3): 67-74.

Lorenzo-Martínez, M. et al. (2020). Effects of score-line on internal and external load in soccer small-sided games. *International Journal of Performance Analysis in Sport*, *20*(2), 231-239.

Machado, J. C., Alcântara, C., Palheta, C., Santos, J. O. L. D., Barreira, D., & Scaglia, A. J. (2016). The influence of rules manipulation on offensive patterns during small-sided and conditioned games in football. *Motriz: Revista de Educação Física*, *22*(4), 0290-0298.

Mallo, J., & Navarro, E. (2008). Physical load imposed on soccer players during small-sided training games. *Journal of Sports Medicine and Physical Fitness*, *48*(2), 166-171.

Mandigo, J., Lodewyk, K., & Tredway, J. (2019). Examining the impact of a teaching games for understanding approach on the development of physical literacy using the Passport for Life Assessment Tool. *Journal of Teaching in Physical Education*, *38*(2), 136-145.

Mesquita, I. M. R., Pereira, F. R. M., & dos Santos Graça, A. B. (2009). Modelos de ensino dos jogos desportivos: investigação e ilações para a prática. *Motriz. Journal of Physical Education, 15*(4), 944-954.

Morales-Belando, M. T., Calderón, A., & Arias-Estero, J. L. (2018). Improvement in game performance and adherence after an aligned TGfU floorball unit in physical education. *Physical Education and Sport Pedagogy*, *23*(6), 657-671.

Moreira, P. E. D., Praça, G. M., & Greco, P. J. (2017). Conhecimento tático processual de jogadores de futebol, futsal e futebol de 7: comparações. *Conexões*, *15*(2), 118-128.

Musch, E., Mertens, B., Timmers, E., Mertens, T., Graça, A., Taborsky, F., ... & Vonderlynck, V. (2002). *An innovative didactical invasion games model to teach basketball and handball*. In: the 7th annual congress of the European College of Sport Science, Athens, Greece.

Olthof, S. B., Frencken, W. G., & Lemmink, K. A. (2018). Match-derived relative pitch area changes the physical and team tactical performance of elite soccer players in small-sided soccer games. *Journal of Sports Sciences*, *36*(14), 1557-1563.

Osman, A. S. H. R. A. F. (2017). Effects of teaching games for understanding on tactical awareness and decision making in soccer for college students. *Science, Movement and Health*, *17*(2), 170-176.

Owen, A. L., Wong, D. P., Paul, D., & Dellal, A. (2014). Physical and technical comparisons between various-sided games within professional soccer. *International Journal of Sports Medicine*, *35*(4), 286-292.

Pasquarelli, B. N., Souza, V. A. F. A., & Stanganelli, L. C. R. (2013). Os jogos com campo reduzido no futebol. *Revista Brasileira de Futebol (The Brazilian Journal of Soccer Science)*, *3*(2), 2-27.

Praça, G. M. et al. (2021). Manipulating the pitch size constrains the players' positioning during unbalanced soccer small-sided games played by different age

groups. *Kinesiology, 53*(2), 206-214.

Praça, G. M., Custódio, I. J. D. O., & Greco, P. J. (2015). Numerical superiority changes the physical demands of soccer players during small-sided games. *Revista Brasileira de Cineantropometria & Desempenho Humano*, *17*(3), 269-279.

Praça, G. M., Folgado, H., Andrade, A. G. P. D., & Greco, P. J. (2016). Influence of additional players on collective tactical behavior in small-sided soccer games. *Revista Brasileira de Cineantropometria & Desempenho Humano*, *18*, 62-71.

Praça, G. M., Morales, J. C. P., & Greco, P. J. (2017). Demandas físicas, fisiológicas, táticas e técnicas no pequeno jogo 3vs. 3 no futebol: uma revisão sistemática. *Revista Brasileira de Ciência e Movimento*, *25*(4), 141-152.

Praça, G. M., Teoldo, I., & Greco, P. J. (2018). Pequenos jogos no futebol: princípios táticos fundamentais em situações de superioridade numérica. *Revista Brasileira de Educação Física e Esporte*, *32*(4), 569-580.

Praça, G., Costa, C., Costa, F., Andrade, A., Chagas, M., & Greco, P. (2016). Comportamento Tático em pequenos jogos no futebol: influência do conhecimento tático e da superioridade numérica. *Journal of Physical Education*, *27*(1), 1-12.

Praça, G., Costa, C., Costa, F., Andrade, A., Chagas, M., & Greco, P. (2016). Comportamento Tático em pequenos jogos no futebol: influência do conhecimento tático e da superioridade numérica. *Journal of Physical Education*, 27(1), 1-12.

Quintal, T., Oliveira, R., Gaspar, A., Pestana, M., & Gouveia, E. (2018). *Contributos do modelo de competência no ensino dos jogos desportivos de invasão nas aulas de educação física.* In: Quintal, T. Livro de Atas Seminário Internacional Desporto e Ciência. Portugal: Universidade da Madeira.

Rebelo, A., Brito, J., Fernandes, L., Silva, P., Butler, P., Mendez-Villanueva, A., & Seabra, A. (2011). Physiological, technical and time-motion responses to goal scoring versus ball possession in soccer small-sided games. *Revista Portuguesa de Ciências do Desporto*, *11*(1), 409-412.

Robertson, M., Hague, C., Evans, M. B., & Martin, L. J. (2019). Do participant reporting practices in youth sport research adequately represent the diversity of sport contexts?. *Psychology of Sport and Exercise*, *45*, 101559.

Romão, E. J. R., da Silva Barbosa, P. V., & Moreira, M. C. (2018). Metodologias de Ensino para Jogos Esportivos Coletivos na Educação Física Escolar. *Revista de Iniciação Científica da Universidade Vale do Rio Verde*, *7*(1), 80-96.

Santos, A. F. G., & Souza, F. T. C. (2018). Os jogos reduzidos como ferramenta metodológica para o ensino e aprendizagem do treinamento (EAT) do futebol. *Revista Brasileira do Esporte Coletivo*, *2*(2), 17-23.

Santos, S. et al. (2020). Effects of manipulating ball type on youth footballers' performance during small-sided games. *International Journal of Sports Science & Coaching*, *15*(2), 170-183.

Sarmento, H., Marcelino, R., Anguera, M. T., Campaniço, J., Matos, N., & Leitão, J. C. (2014). Match analysis in football: a systematic review. *Journal of Sports Sciences*, *32*(20), 1831-1843.

Schollhorn, W., Hegen, P., & Davids, K. (2012). The nonlinear nature of learning-A differential learning approach. *The Open Sports Sciences Journal*, *5*(1), 100-112.

Serra-Olivares, J., & Garcia-Rubio, J. (2017). Tactical problems, key component of the representative design of tasks within the non-linear pedagogy approach applied to sports. *RETOS-Neuvas Tendencias en Educacion Fisica, Deporte y Recreacion*, *32*, 261-269.

Serra-Olivares, J., Gonzalez-Villora, S., & Garcia-Lopez, L. M. (2015). Effects of modification of task constrains in 3-versus-3 small-sided soccer games. *South African Journal for Research in Sport, Physical Education and Recreation*, *37*(2), 119-129.

Siedentop, D. (1994). *Sport education: Quality PE through positive sport experiences*. Illinois: Human Kinetics Publishers.

Siedentop, D. (1998). What is sport education and how does it work? *Journal of Physical Education, Recreation & Dance*, *69*(4), 18-20.

Soares, J., & Antunes, H. (2016). *Modelo de Educação Desportiva: características, vantagens e precauções.* In: Lopes, H., Gouveia, É., Rodrigues, A., Correia, A., Simões, J., & Alves, R. Problemáticas da educação física II. Portugal: Universidade da Madeira.

Travassos, B. et al. (2014). Tactical performance changes with equal vs unequal numbers of players in small-sided football games. *International Journal of Performance Analysis in Sport,* 14(2), 594-605.