Debate-of-ideas setting and configurations of play among beginner female students

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ABSTRACT

The current study aimed to investigate the concept of game model and the notion of prototypical configuration, which are designed and used to conduct qualitative analysis of game-play in team sports. To carry out this study, a qualitative methodology was used, and a sample of 20 female students (aged 19 ± 0.3 years) was taken from the Physical Education program at Sohar University. Data were collected through video recordings. The main result showed a noteworthy progression at the level of the tactics of the game which is translated by the elaboration of the new configuration of play in the game. This evolutionary process of configurations emphasizes a progressive understanding of the game based on critical thinking. These configurations are momentary and over the course of the game, they are linked to each other. Nevertheless, to decode them, reference points are needed, operative images which, after identification, allow for a quicker response adapted to the perceived situation. A proper analysis of player thinking behind the different forms of play, moves and configurations of play requires that one assumes the development of a tactical intelligence of game play.

1. INTRODUCTION

The time available at school to learn in team sports is relatively limited compared to that available in an associative structure. Therefore, it is necessary that students quickly build knowledge and motor skills. However, once built, this knowledge can serve as a basis for faster learning in the management of other momentary configurations of the game.

In team sports with a constructivist approach, modeling and efficient-action rules imply construction by students. This requires an evolution of the various concepts involved, a progressive integration, step-wise or level-wise, into a thinking process (Grehaigne, 2009). Moreover, Gréhaigne et al. (2001) propose that this concept of perceived configuration of the game is at the heart of didactic thinking about decisions in the game. It refers to the relative positions of the players of the two teams in relation to the possession and position of the ball, as well as the movements of the players. Faced with momentary configurations of the game, individual tactics allow players to respond to the problems posed by the probable evolution of the game. This individual tactic combines, within perception, motor skills developed throughout life with tactical knowledge and allows the ball carrier to decide how to continue playing. This concept is similar to the notions of "patterns of play" (Ali & Farrally, 1990), "situations of play" (McPherson, 1993), and "display" (McMorris & Graydon, 1997). This concept of game configuration seems important because it is likely to optimize the activity of the players during the game of movement by allowing them to characterize momentary states of the relationship of forces and their probable evolutions. The position, speed, and movements of partners and opponents also contribute to the decision (Gréhaigne et al., 2016). Thus, a relevant analysis of the configurations of the game helps to understand the evolution of the game, even if the use of a planned diagram can constitute a temporarily effective tactical adaptation (O'Connor et al., 2022).

The most common game configurations are called prototypical in the sense that they represent an original model, the archetype of a model that is reproduced (Gréhaigne, 2007; Zerai, 2019). Knowledge of these configurations allows students to build prototypes by categorizing geometric shapes, classes of object properties, and finally, temporal relationships, in order to be more effective in the game. The cognitive representations, and therefore the knowledge that is constructed in this way, are fundamentally realized by a "perception/action" coupling. They aim to update invariants to recognize and decide quickly about the perceived configurations of the game (Gréhaigne et al., 2021). These configurations are momentary, and over the course of the game, they are linked to each other. Nevertheless, to decode them, reference points are needed—operative images that allow, after recognition, to propose more and more quickly a response adapted to the perceived situation. Active

teaching using debate cultivates multifaceted thoughts and develops attention, understanding, and the use of appropriate knowledge and skills, thanks, in particular, to a positive attitude from the girls (Zerai et al., 2021).

The current study aims to investigate the concept of game model and the notion of prototypical configuration, which are designed and used to conduct qualitative analysis of game-play in team sports. This study will consider a certain number of signs and indications that make it possible to quickly identify a game situation and its future. Next, it will look at the characteristics of a particular type of analogy-based learning.

2. METHODS

2.1. Design and Participants

This was a descriptive study, designed to determine which offensive configurations of play may be observed when young novice players play handball. To collect data, a qualitative approach based on observation was used.

A minimum sample size of 20 participants was determined from an a priori statistical power analysis using G*Power software [Version 3.1, University of Dusseldorf, Germany]. The power analysis was computed with an assumed power at 0.95 at an alpha level of 0.05 and a moderate effect size of 0.7. The participants consisted of 20 girls of level 1 that enrolled in physical education program at Sohar University. The sample was chosen in pilot method. The age of the participants was about (19 ± 0.3) years old, height 1.60 ± 0.03 m and 56.75 ± 0.86 kg. This was the first time that these girls had practiced handball as a team. These girls were divided into two groups: the first one, the control group taught by the traditional method, the second one was an experimental group taught by using verbalization in addition to the traditional method (Figure 1). Matches were played with a four vs four player format.
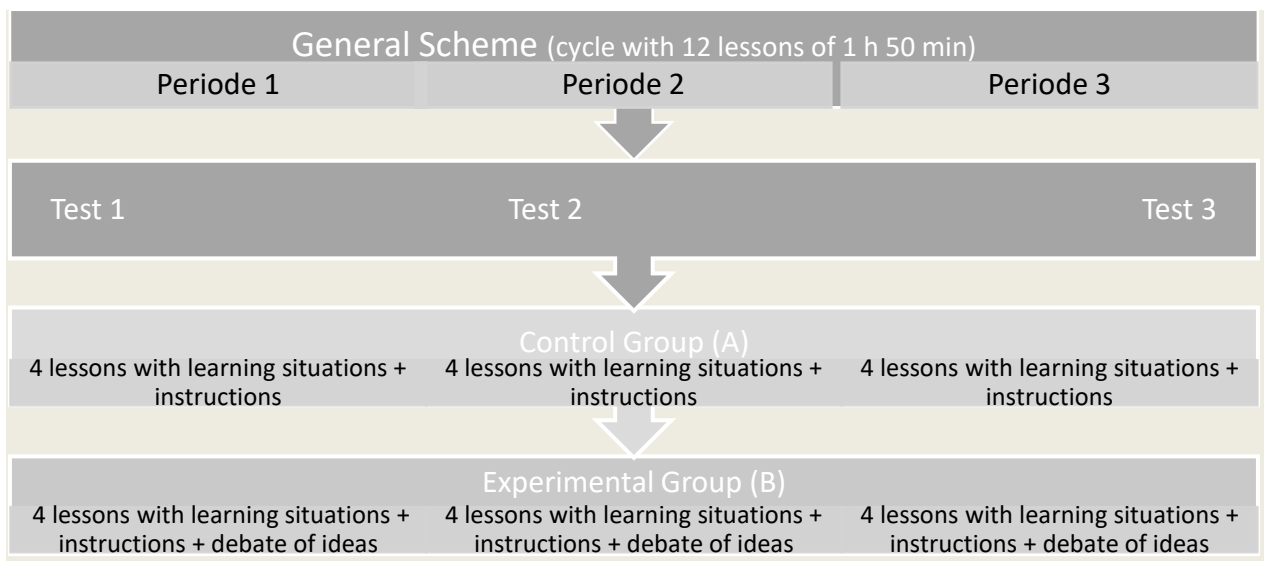
General Scheme (cycle with 12 lessons of 1 h 50 min)		
Periode 1	Periode 2	Periode 3

Test 1	Test 2	Test 3

Control Group (A)		
4 lessons with learning situations + instructions	4 lessons with learning situations + instructions	4 lessons with learning situations + instructions

Experimental Group (B)		
4 lessons with learning situations + instructions + debate of ideas	4 lessons with learning situations + instructions + debate of ideas	4 lessons with learning situations + instructions + debate of ideas

Figure 1. Organization of the teaching cycle for each group

An introductory lesson was organized for team selection. Each team had 12 learning sessions. The experimental group played for a preliminary time of 14 min and then verbalized for 4 min. The group went back into the game to validate/invalidate the decisions already made during the debate session. The aim was to enable students to co-construct shared knowledge and improve their critical thinking (Zerai & al 2021).

2.2. Procedures

A good way to get game data from small-sided games is to use video to analyze game sequences. The methodology consisted of selecting and analyzing, in 10- to 14-minute matches, game sequences that had led to a successful or unsuccessful shot at the net; game sequences were defined as exchanges between players from the moment the team gained possession of the ball until the shot at the net. The population was divided into two groups (A and B). Each group was composed of four field players, a goalkeeper, and four substitutes. Matches were played with a 4 vs. 4 formats in a reduced half-court playground (dimensions: 20 m long and 10 m wide). The game sequences were recorded on a video involving 20 female students at the end of a series of ten two-hour lessons. A total of 230 video sequences were selected for analysis. The 230 sequences of playing were classified first by an observer who was an expert in team sports, and each classification was thereafter checked by two observers also specializing in team sports (Zerai et al. 2014).

According to Zerai et al. (2013), in order to analyze such data, one must examine more closely the circulation of the ball and that of the players in a specific game situation. In the 'social practice of team sports', a systematic analysis of game play reveals how players use an operating logic, from the

recognition of an unbalanced configuration of play to its exploitation (Deleplace, 1994). Such pathways can be identified if the student considers that the initial organization of game play is also embedded in all others that will follow. This first action is referred to as the "mother phase of the play" (Gréhaigne et al., 2004). Keeping in mind this notion of the mother phase of play, observers based their analysis on three criteria [location of ball recovery with reference to the field, location of recovery with reference to the effective (occupied) play space, and selection of play after recovery of the ball] that led to the classification presented.

-Location of ball recovery with reference to the court: (a) high ball recovery (in the opponents' side of the court); (b) recovery in the middle area of the court; (c) low ball recovery (in one's own side of the court).

-Location of recovery with reference to the effective playing space (EP-S): (a) recovery at the front of the E P-S; (b) recovery at the rear or in the middle area of the E P-S.

-Selection of play after recovery of the ball: (a) ball exchange with a teammate (long pass, short pass, number of passes); (b) dribble

The 230 sequences of play were classified first by one expert observer in team sports, and each classification was thereafter checked by two other observers also specializing in team sports. In a similar analysis of configurations of play in soccer, Gréhaigne et al. (2010) reported a 95% percentage of agreement between observers. Although this study was conducted with basketball players, conditions of play were very similar in the sense that novice players tend to play slowly and to use typical plays, so the analysis poses no problem for expert observers. The few sequences (less than ten) in which conditions of recording did not produce a clear image of game play were deleted.

3. RESULTS

Two groups of participants followed a teaching program of 12 lessons. These girls were divided into two groups: the first was the control group taught by the traditional method, and the second was an experimental group taught by using verbalization in addition to the traditional method.

3.1. The configurations of the game for young girls

To avoid ready-made theories of action, it is necessary to first carry out a systematic observation of the game and then a real ethological study of the behavior of the players. The observation of the sessions allowed us to notice that, while advancing in learning, new configurations appeared or old configurations improved. Among the Omani young girls, during the first session as well as at the

beginning of the fifth, we observed a very important use of the dribble for the progression and/or the overflow of the defense. Passes were short, slow, and on the same side of the field. The ball circulated according to the placement of the girls and their movement, which was in most cases very slow (Grehaigne et al., 2019). The throw-in was often done by the goalkeeper, which underlines the virtual absence of interception of the ball by the defenders. From the second part of the fifth session and during the last session, important changes concerning the configurations of play occurred, with the appearance of new forms of play. The exchange of the ball became fast and precise, which highlighted good management of the ball carrier's and partner's distance. A significant number of balls were intercepted in the middle of the field, thus underscoring the importance of the information collected and the quality of the interpretation. The long passes seemed characteristic of these sequences of the game, giving rise to new spaces of play following the reversal of the game. We can thus speak of a real "co-construction" of the attack and defense systems. At this level, the circulation of the ball is still a consequence of the location occupied by the players on the field.

The explanation of the internal logic of a physical activity makes it possible to make players aware of precise axes of modeling that form a coherent and operational whole. Thus, the girls have a certain "mental image of action" that is more or less elaborate. They do not burden themselves with a quantity of useless data to solve the problems encountered. This mental image of action also allows them to select only the information best suited to the context, which seems useful to continue the action in progress. Accordingly, we can conclude that the girls understood that in an opposition relationship, it is a question of coordinating collective actions in order to recover, keep, advance the ball to the goal, bring it into the scoring area, and score.

According to Genevois & Wallian (2020), the learning activity can be defined as an activity of construction of meaning in which the subject reorganizes his horizon of expectations. For this purpose, it is most often necessary to get ahead of the defensive replacement, maintain this lead, and achieve success. Careful observation of the video recordings of the players in action allowed us to unearth a number of configurations. The latter inform us about the nature and characteristics of the elements forming the system (partner, adversary, place, and time) during a balance of power.
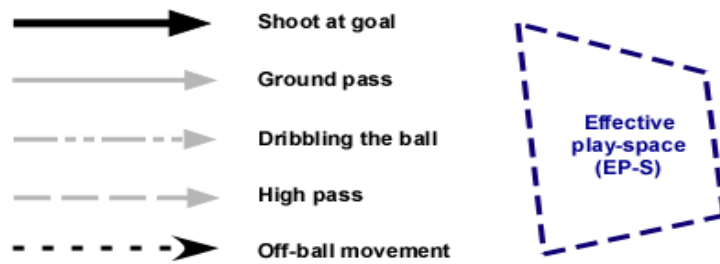
Figure 2. Caption used for the different configurations of play

3.2. Low recovery at the front of the effective play space, then circulation of the ball

This is a very common configuration among beginners. This configuration begins following a missed shot and a throw-in from the goalkeeper. This recovery is followed by driving the ball and/or exchanges of the ball in short and high passes, most often in the width. This generally reflects the inability of the player carrying the ball to advance alone towards the scoring area. However, when the attack comes within shooting range, it usually ends up being a safe shot. Figure 2 setups also often occur when the long throw is not yet established. The forwards exchange the ball using short, bell-shaped passes across the way because the defense occupies the center line or is in front of the ball carrier, preventing them from passing forward. This flat circulation in the strong dimension of the defense leads most typically to a loss of the ball to the benefit of the opposing team and frequently results in a spontaneous shot by the player who has recovered it.
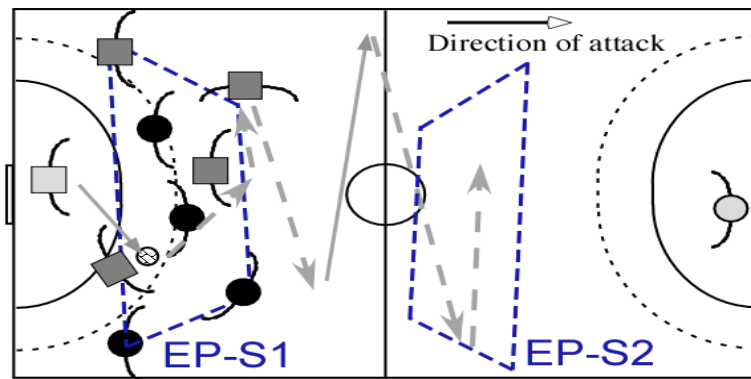

Figure 3. A flat circulation of the ball

3.3. Recovery at the rear of the effective play space, then fast play towards the goal

This configuration (Figure 4) occurs following an interception of the ball by a defender who becomes the first attacker. This frequently reflects the difficulty for players who are on the attack to get the ball into the defensive system. After recovery, a pass is made to a well-placed or unmarked player, who leaves the ball in the depth and shoots.
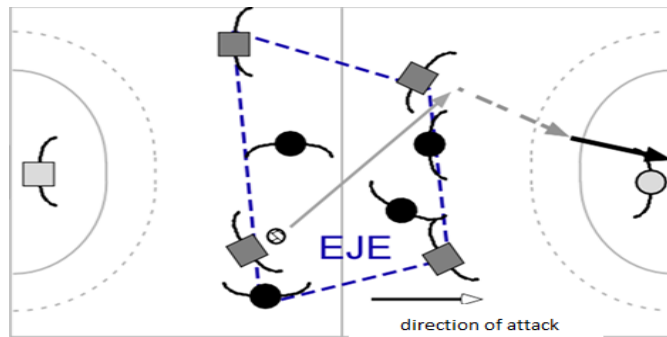
Figure 4. Recovery at the rear of the EP-S who is in the middle of the field then passes to a partner, driving the ball and shooting

3.4. EJE backward play following a goal clearance or a face-off

In the following, Figures 5 and 6 offer two modes of engagement in the field.
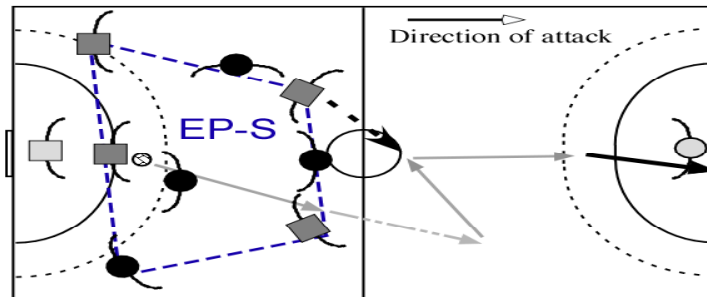

Figure 5. Recovery in the defending area during transition play: the ball is passed, dribbled, and passed forward. The attacker then either makes a final pass or dribbles, resulting in a shot at goal

In the first case (Figure 5), a short pass from the keeper and then a forward clearance pass from the EP-S allow a partner to dribble to the target and shoot. This is often the consequence of replacing defenders too slowly. Figure 4 illustrates a particular feature of this type of game play when it includes, at a given moment, a forward-ball play (the ball travels backward).In the second case (Fig. 6), a pass in the empty space over a static defense barrage allows a partner to receive the ball with a head start and to shoot from a favorable position. The player dribbles the ball to the scoring zone and shoots at goal. In the second configuration (Figure 6), after a forward high pass, a partner catches the ball, dribbles, and shoots at goal. These two configurations are very brief, and this is generally due to a lack of attention on the part of the defenders.
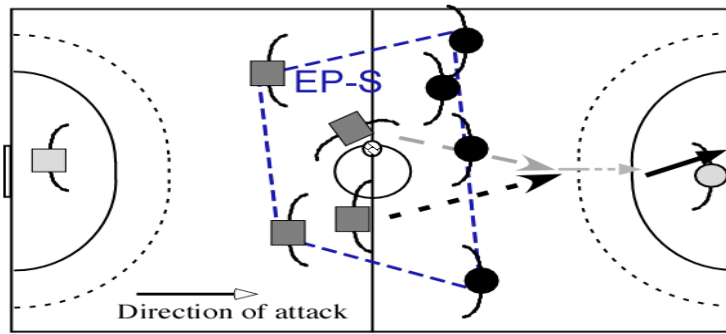
Figure 6. Restarting the game with a forward high pass

3.5. Recovery in the defending area at the periphery and the front of the EP-S

Figure 7 presents, in the first sequence of game play, an initial configuration of play where the effective play space is stabilized in the offensive area of the black circles. It illustrates the difficulty of the attack to penetrate the defensive in-block system. There follows a ball recovery at the front of the effective play-space of the new attack (corresponding to the rear of the effective play-space for the former attack). The player who has conquered the ball dribbles towards the goal and takes a shot at it or tries a fake shot on the goalkeeper. This type of game play occurs when the ball holder is sufficiently confident in her speed of dribbling. If the player feels he or she cannot get to the goal, the ball may be passed to a partner.
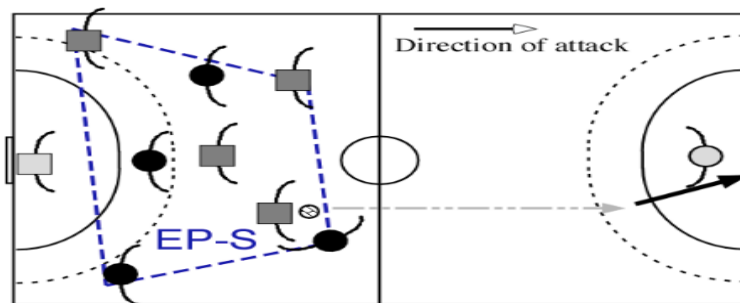

Figure 7. Recovery in the defending area at the periphery and the front of the effective play-space, dribbling in the free space and shot at goal

3.6. Recovery in the attacking area at the front of EP-S and shot at goal

Figure 8 presents a configuration of play often seen with novice players when the ball is intercepted in the defending area of the black circles at the rear of the effective play-space (i.e., at the front of the effective play-space of the grey squares).
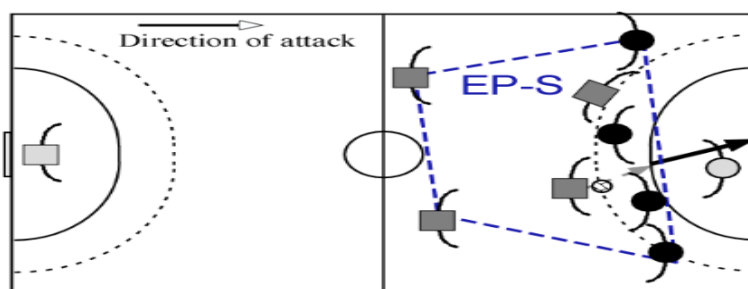
Figure 8. Recovery in the attacking area at the front of EP-S and shot at goal

The interception is followed almost immediately by a shot at goal. This configuration appears with a corner throw or after a missed throw by the goalkeeper. With better players, it can be the result of pressure on the ball holder or it can occur when attackers exchange the ball at the rear of the effective play-space in their own part of the court. So, after a goal in a small-sided game format, it is better to restart the game in the middle of the court to avoid this type of configuration of play.

4. DISCUSSION

This formalization presents some risks and limits. Each solution constitutes, in a way, an entity specific to a specific context. The formal solutions capable of solving a problem posed by the game can be numerous, which sometimes leads the teacher to make more or less arbitrary choices. In such cases, it must be admitted that formalization represents a necessary impoverishment of the great variety of data, hence the temptation to reduce the properties of the game to a few precepts. Finally, many phenomena related to communication and tactics resist attempts at formalization. Only a rigorous delimitation of the facts appears to us to be likely to partially avoid these pitfalls.

The act of holding the ball in handball gives the game special characteristics because playing in a stabilized space is relatively important. In this case, development among students often involves constructing a code for the movement of players and the ball. It will therefore be a question of providing or having the girls build models of the game from a few relatively stable prototypical configurations. Their appropriation assumes that the proposed models can evolve according to the progress made; they must be discussed (Roland-Alvarez et al., 2020) to allow a good stabilization of learning and finally to make them work in order for the players to become aware of their field of application and their validity. Thus, we can rectify them and/or make them more complex through interaction and by integrating the consequences of the newly carried out experiments. After this work of identifying prototypical situations and their probable evolution, the central problem of teaching them to pupils now arises.

When we try to build an authentic analytical framework with the students based on the specific dimensions of a game situation, not only can the results obtained be important, but in addition, we realize that there are convergences with the previous analyses concerning other situations or configurations of the game play.

In team sports, due to a constantly changing environment, the temporal characteristics and spatial movements of the players and the ball must be analyzed according to observables that the player orders. After some experimentation at Sohar University, it seems that the vision and study by students of well-chosen game configurations, presented in the form of video sequences, facilitate learning the game play. Here, the distinction made by Ochanine (1978) between cognitive images and operative images (Uliaz, 2021) is fundamental because it establishes an essential fact: the subjects, who are in charge of an objective, orient the collection of information in order to forge a representation aimed at ensuring that these objectives are achieved. This "economic" image, reduced to the essential elements, has the main properties of adaptation to the opposition, laconicism, plasticity, and an intentional character.

The study of all the prototypical configurations should allow students to build prototypes by categorizing geometric shapes, classes of object properties, and finally temporal relations, with a view to being more effective in games. The video, by favoring a priori certain elements of the game, helps the player process these operative images faster when they appear in the perceived configurations of the game. In this context, the debate involves the use of cognitive skills such as interpretation, argumentation, inference, analysis, evaluation, putting forward solutions, creation, and contextual decision-making (Brown et al., 2021). It also means looking for meaningful and reliable information and being able to adapt to changes (Uribe et al., 2017). Whereas in the classic form of debate, students resort to critical thinking of opposition (some arguing in favor and others against a given resolution) (Zerai et al., 2021), here the debate of ideas advocated calls for cooperative critical thinking, which aims to reconcile the positions of each other and to co-construct from each other's ideas so that everyone benefits from the experience (Tan, 2017). Gréhaigne et al. (2004) have shown the need to study the transition from one game configuration to another game configuration to better understand the evolution of a game sequence. Nevertheless, a fundamental question remains: does the prototype constitute a mental image shared between the players, from which they can deduce the prototypical properties, or rather a bundle of typical traits, from which they will be able to judge the degree of similarity between one configuration and another?

Following a good understanding of the game and good planning before, during, and after the action, the players were able to vary their style of play (Paraxides et al., 2018). They adapted the playing conditions to their technical and tactical abilities at the time. They believed in their abilities; they built the long pass, the direct counter-attack, a fast speed of execution, and precise exchanges of the ball. They were better able to manage the relationship between their positions, their movements, and the paths of partners and opponents in relation to the trajectories and paths of the ball in concrete game situations. They understood that the duration of the game (twice 15 minutes) is a necessary and obligatory factor that they must learn to manage well, particularly in terms of physical abilities (Gehaigne, 2013).

As team sports are characterized by continuous interaction and uncertainty, Omani girls were constantly led to make decisions aimed at regulating and adapting to the changing configurations of the game. This result is attested to by the appearance of new, more complex game configurations towards the end of the cycle. To win, it is not enough to attack or defend, but to make these two actions coexist. If tactical knowledge is built using cognitive tools, verbal interactions should be conducive to its development (Ben Khalifa et al., 2021; Zghibi et al., 2021). The experiments show an effect of the learning condition with verbalization on the action plan, on the relevance of the choice, and on the effectiveness of the action during the meetings. There would therefore be an interest in the construction of long-term tactical knowledge in the implementation of a true semiotics of motor action in team sports (Wallian & Chang, 2007; Grehaigne et al., 2014).

The configurations of game play are variable since the actions of the players bring about changes. As the game evolves, new relationships are established between game elements, and other relationships are destroyed. This strategy, practiced in terms of learning with play, debating ideas, and returning to the game, is a novelty for the players and underlines the importance of thinking before taking the next action. The discussion is approached here from a cognitive learning angle (Kirk & McPhail, 2002); this approach aims to build knowledge and new motor skills. The perception of the task refers to the meaning and importance that the player attributes to the elements of the situation, which consists of identifying the informational clues relevant to the problem posed. It is then necessary to give meaning to these indices. Any meaningful perception is educational because it leaves traces in the memory that can be reused. According to Raoms et al. (2020), this leads to an evolution of the design of the game, its components, its rules, and its tactical aspects. This evolutionary process of configurations emphasizes a progressive understanding of the game based on critical thinking (Zerai et al., 2021; Godbout et al., 2020). The development of reflective thinking and practice revolves around

critical and creative thinking, argumentative skills, and metacognitive skills (Godbout, 2003). Finally, tactical thinking is based on experience and cognitive tools that give it an active character, favoring initiative. In team sports, the development of autonomous tactical thinking (Gréhaigne & Caty, 2014; Zerai et al., 2021) makes it possible to analyze and organize responses to similar problems.

5. CONCLUSIONS

The didactic model constitutes a sufficient approximation to be operational with respect to the given problems and the resolution procedures of the students. Its appropriation supposes that the model can be discussed, that it can make players aware of its fields of application and validity, then rectify it or make it more complex through interaction by integrating the consequences of the newly carried out experiments. To avoid ready-made theories of action, it is necessary to carry out a systematic observation of the game and an ethological approach to the behavior of the players; this meticulous study consists of observing and considering the player in her environment. In team sports, this observation is part of determining the activity of the players in a given opposition relationship, which generates game configurations. The use of metacognition mechanisms in this type of learning allows the player not only to evaluate and interpret whether he is in a situation of success or failure but also to contribute to his own transformations as reflected in the construction of new configurations of the game.

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AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

FUNDING

This research received no external funding.

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