

# Organization of Physical Education Teaching and the Development of Students's Theoretical Thinking

## Organização do Ensino da Educação Física e o Desenvolvimento do Pensamento Teórico dos Estudantes

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### ABSTRACT

This article presents a research that aimed to investigate the theoretical-methodological conditions capable of generating results, through the teaching of Physical Education, learning that promote the development of students. Theoretical concepts in physical education mean meanings that enable different phenomena that provide students with either theoretical and conscious thinking and specific concepts of physical education that can be expressly specific, that is, a bodily action allowed to be AND immediately become voluntary and mediated by the theoretical concepts. As not all teaching has training potential, we ask ourselves: how to organize Physical Education in order to promote this development? In search of answers, we carried out a didactic study, without which actions did fundamental experiments in the Historical-Cultural Theory were formulated in a class of the 4th year of Elementary School, working contents of a collective game. Through the analysis of the experiment, we concluded that in the organization of actions, as did

### RESUMO

Este artigo apresenta resultados de uma pesquisa que teve como objetivo investigar condições teórico-metodológicas capazes de gerar, pelo ensino da Educação Física, aprendizagens promotoras do desenvolvimento dos estudantes. Os conceitos teóricos na Educação Física expressam significações que constituem os diferentes fenômenos da cultura corporal, conceitos estes cuja apropriação propicia aos estudantes o desenvolvimento do pensamento teórico e o domínio consciente e voluntário das próprias ações corporais, ou seja, possibilita que a ação corporal deixe de ser imediata e instintiva e passe a ser voluntária e mediada por conceitos teóricos. Como nem todo ensino tem esse potencial formativo, nos perguntamos: como organizar o ensino da Educação Física de modo a promover esse desenvolvimento? Em busca de respostas, realizamos um experimento didático, no qual ações didáticas fundamentadas na Teoria Histórico-Cultural foram desenvolvidas em uma turma do 4º ano do Ensino Fundamental, trabalhando conteúdos de um jogo coletivo. Mediante a análise do experimento, concluímos que, na

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the practices that pre-conceptualized teaching, the theoretical concepts play the role of student rehearsal were a presentation of the media of the learning problems to be solved by the media of the concepts in study ; collective discussions between students and between them and the teacher; the use of language, in this case, modeling, as a means to systematize abstract relationships presented in the particular task performed; inclusion of new problems that can be solved based on the abstraction expressed in the modeling.

**Keywords:** Organization of Physical Education teaching. Theoretical Thinking. Theoretical concept. Historical-Cultural Theory.

organização do ensino, as ações didáticas que favoreceram que os conceitos teóricos exercessem o papel de mediadores das ações corporais dos estudantes foram: a apresentação de problemas de aprendizagem a serem resolvidos pela mediação dos conceitos em estudo; as discussões coletivas entre estudantes e deles com o professor; o uso da linguagem, no caso, a modelação, como meio para sistematizar relações abstratas presentes na tarefa particular realizada; inclusão de novos problemas que podem ser resolvidos com base na abstração expressa na modelação.

**Palavras-chave:** Organização do ensino da Educação Física. Pensamento Teórico. Conceito teórico. Teoria Histórico-Cultural.

## 1 Introduction

According to Historical-Cultural Theory, the role of educational institutions is to provide access to socially constructed culture, enabling individuals to understand the phenomena of objective reality. Synthesized into theoretical concepts, this culture, when appropriated, develops students' higher mental functions, especially theoretical thinking.

Thus, teaching in all disciplinary fields should be focused on offering these theoretical concepts, which are nothing more than mediating instruments that allow individuals to change their way of thinking and acting in the world. If it is true that we are surrounded by physical, chemical, linguistic, and social phenomena, among others, then the mediation of concepts from these fields of knowledge is required in order for such phenomena to be understood.

The same is true of phenomena related to physical culture (COLETIVO DE AUTORES, 1992): they can be understood through the mediation of concepts from the field of Physical Education, hence their role as a component of the basic education school curriculum. The theoretical concepts (DAVIDOV, 1988) in this discipline express the necessary and essential meanings that constitute the

different phenomena of body culture (dance, gymnastics, games, athletics, fighting, circus, etc.). The appropriation of these meanings by students fosters the development of theoretical thinking, allowing phenomena of body culture to gain intelligibility and expanding the possibilities for conscious and voluntary mastery of one's own bodily actions.

However, not all forms of teaching concepts promote learning and, consequently, student development. As Vigotski (2010) pointed out, only adequate organization of learning results in mental development and sets in motion various developmental processes. The search for this adequate organization of concept teaching is something to be considered in the field of Physical Education as well.

Often, classes in this discipline are understood as responsible for learning that only promotes the development of physical abilities and/or motor skills apparent in physical activities. Therefore, its function would be linked solely to the development of the body, while other subjects would have an impact on mental development. This conception reveals a classic division between body and mind that has long accompanied philosophical thought and, consequently, the history of Physical Education, making it a curricular component in which there is no room for theoretical knowledge.

As a legacy of this conception, it is not always clear what the specific content of this area of knowledge is. It is common for some teachers, when asked what content they are working on, to cite the activities performed, such as games, dances, fights, and gymnastics, rather than the content that is present in these activities. As there is no clarity about the underlying theoretical content, its relationship with the development of students' psyche remains unclear.

Therefore, two challenges must be addressed in this field: the clarification of the theoretical content present in physical culture and the ways of organizing the teaching of this content. In this article, we turn our attention to the second theme. It was the subject of a study guided by the following

question: How can physical education be taught in a way that promotes the development of students' theoretical thinking? Our objective was to *investigate the theoretical and methodological conditions capable of generating, through physical education, learning that promotes the development of students' theoretical thinking.*

## 2 Methodological Approach

The research was conducted through a didactic experiment. In this article, we will highlight the analysis of the data collected in the experiment. This research methodology is inspired by the formative experiment conducted by Davidov in Soviet schools and “[...] presupposes the projection and modeling of the content of new mental formations to be constituted, of the psychological and pedagogical means, and of the ways of their formation” (DAVIDOV, 1988, p. 196, our translation). For this reason, the researcher observes teaching and learning situations and plays an active role in organizing the teaching and learning activities to be carried out for research purposes<sup>3</sup>.

We call the experiment didactic because we intend to analyze which didactic actions in the teaching of Physical Education content favor learning that promotes student development.

For the process of planning, executing, and evaluating the organization of teaching, we start from the teaching principles and actions developed by Sforini (2015; 2017) as an expression of the theoretical and methodological foundations linked to the teaching of scientific concepts in student learning, with the aim of promoting the development of theoretical thinking. The proposed actions, derived from the analysis of the content-subject-form triad, are: Development of triggering problems, whose solution requires the student to mediate by concept; provision of moments for students to dialogue with each other and develop collective syntheses, even if provisional; use of scientific and

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<sup>3</sup> To learn more about this research methodology, see: AQUINO, 2013; DAVIDOV, 1988; FREITAS, 2010; NASCIMENTO, 2010; SFORINI, 2017, 2019.

classic texts from the respective area of knowledge; guidance of the process of conceptual synthesis by students (dialectical union between student language and scientific language); presentation of new learning problems at the end of the study process to analyze whether students operate mentally with the concept (action on the mental plane - use of the concept as a mediator - generalization) (SFORNI, 2017; 2019).

Twenty (20) students aged between 8 (eight) and 9 (nine) participated in the educational experiment, of whom 8 (eight) were boys and 12 (twelve) were girls. All were in the 4th grade of elementary school at a municipal school in the city of Presidente Prudente, São Paulo, and participated in the full-time education project. The activities of the experiment were developed during the opposite shift, in the games workshop previously established in the project's curriculum. The games classes took place twice a week, each lasting 60 minutes, totaling 11 classes.

The theoretical content developed in the didactic experiment was, according to Nascimento (2014), specific to collective games: control of space with a view to *controlling the physical actions of others*. In the very structure of this type of game, the objectives to be achieved by the teams are mutually opposed and directed toward the same target.

The collective game called “pique-bandeira” was used to teach and learn this content. This game consists of forming two teams, each with a territory demarcated by the center, side, and end lines on the court. Parallel to the end line is the area designated for the flag, demarcated by the center, side, and end lines. The challenge of the game is to cross the opposing team's field and enter the flag area, grab the flag, and bring it back to your territory. When a player invades the opposing territory and is touched by it, they will be “frozen” (they must remain motionless) and can only be freed if another player on their team manages to touch their body. The area designated for the flag is considered an immune space, and players who enter it are exempt from “freezing.”

In capture the flag, the general concept is expressed in the team's physical actions (ways of acting) that aim to occupy the space to control the physical actions of both their team and the opposing team to defend and attack the flag. Controlling the physical actions of others becomes a complex task, as students are required to develop their actions with the actions of other players on their team, while at the same time dealing with problems that arise in the game in relation to their opponents. Therefore, it presupposes the formation of strategies and tactics that solve the general problem of the game: the conquest of territory or space (NASCIMENTO, 2014).

The sources of analysis were the teaching actions and the students' actions during the performance of the proposed tasks, the gestures and verbal expressions captured via video recordings, and written records produced by the students.

To organize the data to identify the students' learning and development, we used conceptual units of analysis, that is, “[...] core and mediating concepts that reference, from beginning to end, the researcher's analysis actions and allow us to grasp the object of investigation in its entirety” (NASCIMENTO, 2010, p. 123). The definition of the units of analysis was inspired by Vygotsky's explanation of changes in human behavior due to the appropriation of culture.

Culture gives rise to special forms of behavior, modifies the activity of psychic functions, and builds new levels in developing human behavior systems [...]. In the process of historical development, social man modifies the modes and procedures of his behavior, transforms his natural inclinations and functions, elaborates and creates new forms of behavior, specifically cultural ones (VYGOTSKI, 1995, p.34).

Thus, we sought to understand the changes in student behavior caused by the knowledge presented in the study tasks. The units of analysis were immediate physical action; physical action mediated in the planning of individual action; and mediated collective physical action. Through these, it was possible to analyze the

teaching actions that would contribute to the students' bodily action ceasing to be immediate and instinctive and becoming mediated by the concepts present in the activity they were performing, allowing them to master their action, as well as the actions of other classmates involved in the activity.

Considering that it is impossible to present, within the limits of this article, the analysis of all the data collected over 60 hours of experimentation, we selected some scenes representative of each unit of analysis, which, taken together, reveal the interaction between teaching actions and the movement of students' thinking, an interaction that is expressed in the modification of their bodily actions. To preserve the students' identity, they are referred to by fictitious names.

### **3. The process of developing theoretical thinking: analysis of the relationship between teaching, learning, and development**

#### **3.1 The first actions: immediate physical action**

As an initial part of the analysis process, we asked the students to play a few games of capture the flag without any systematic interference from the teacher/researcher. Our goal was to capture how the students performed their physical actions in the game before conducting the teaching experiment. This moment provided us with parameters to compare the initial physical actions, without teacher intervention. Those were performed during and after the didactic experiment, thus allowing us to verify the adequacy of the teaching approach, considering its impact on student learning and development.

In the tactical diagram<sup>4</sup> (Figure 1), we can see three players from the blue team in the flag area (offensive system). These players are performing their physical actions in an attempt to capture the flag, that is, to attack the opposing team, while the other players on that team are in their territory. However, we can

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<sup>4</sup> We extracted photos from the recorded classes and used them as data for analysis, but the photos do not always adequately illustrate the aspects analyzed in the scenes presented. For this reason, at times, we considered it necessary to use figures (tactical diagrams) to represent the students' positions on the court and their actions, with the intention of facilitating the reader's comprehensive visualization of the scenes, which was compromised in the photographic record.

see that one player is performing physical marking actions (attempting to prevent the physical action of the opponent) on a player from the red team who is in her territory, leaving the other player to perform, alone, the defensive physical actions of the red team player who is in the flag capture area.

Regarding the red team, we note that one player is “frozen” in the blue team's territory. This game situation is shown in Figure 1 with a circle around the image representing the player. When attempting to cross the court searching for the flag, this player's trajectory is interrupted when the opponent who was in her territory manages to defend against this action by touching the player's body and, consequently, immobilizing her until another person on her team is able to save her—in order for an immobilized player to move again, another person on her team must touch her body. Finally, we have the other players on the red team in their territory, performing defensive physical actions against the three players on the blue team who are in the flag area. To organize this description, we have created Figure 01:

Figure 1. Distribution of players in defensive and offensive systems



Source: Authors

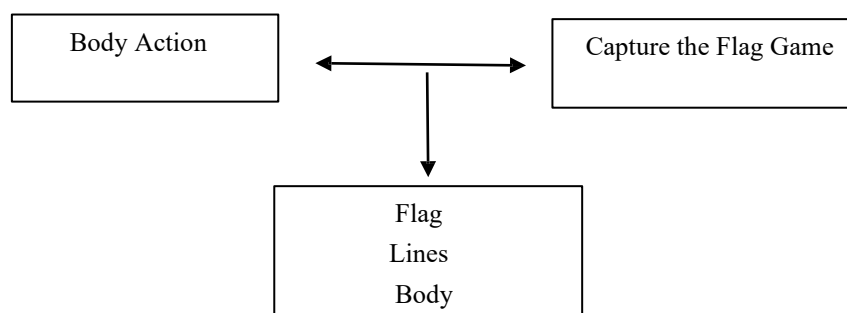
Among the situations that were most common during the first classes, the following stand out: the imbalance in the distribution of players between attacking and defending roles, observed by the greater number of players

seeking to capture the flag in relation to the smaller number of those defending it; the numerical disparity between the available players who could move and those who remained “frozen” (immobile); the disorganized way in which the teams occupied the space.

Why did the game happen this way? Possibly because of the immediate relationship that players established between the problem they had in the game and how they could solve the problem through their physical actions. We observed that many players from both teams moved around in an attempt to capture the flag, as is the case with the blue team in Figure 1. The problem established in the game for these students was to capture the flag, which was the main objective, and therefore the response to this problem was to run towards the flag within the playing space delimited by the sidelines, while trying to avoid any opposing players who were in their way.

In Figure 2, we present a diagram that seeks to highlight that, in these initial moments, the students' relationship with the game was mediated by the flag, the line delimiting the playing area, and the body, mainly that of the opponent.

Figure 2. Diagram showing the mediation between bodily actions and play



Source: Authors

When their actions are guided by this immediate relationship, each individual acts in isolation, even when in a group. From this perspective, the game results in a number of players running recklessly around the court, as highlighted earlier, with the aim of reaching the flag and avoiding opposing players who may appear as obstacles in the pursuit of this goal.

It is important to note that the tactical scheme used to illustrate certain scenes from the game is a snapshot that represents the situations that were most frequently repeated in the game at a given moment during the educational experiment. However, we must not lose sight of the fact that this snapshot is the result of a process, and, therefore, it is necessary to imagine the dynamics that led to the image we are now highlighting for analysis. In this case, to understand it, we need to imagine several actions occurring more or less simultaneously: the three players running at the same time to reach the flag space, one player being frozen, another player reaching the flag area—that is, a crowd of people running within the space of a court.

The attention, perception, and thinking of the players, guided by this immediate relationship that we are demonstrating, did not allow them to perceive the other events that were occurring during the game and that might have allowed them to organize their physical actions differently. For example, at no point did the red team consider unfreezing the frozen player (Figure 1), leading them to play with one less player throughout the match. The numerical inequality of players between teams makes the game even more difficult for the team that has fewer players available to move around, since the playing space, which should be “divided” between the players, becomes larger, making it difficult to control the physical actions of the opposing team that has one more player.

In summary, the situations under analysis, shown in Figure 1, illustrate that the apparent and empirical objects of the game (flag, opponent's body, and lines delimiting the playing space) mediate the psychic functions of attention, perception, and thought—and it is these that guide bodily actions. Therefore, we call these bodily actions immediate, as they are established through an immediate and empirical relationship between the problem and the way it is solved, which results in a disorganized game by the teams. It is not the team that exercises a function over the players' bodily actions, but rather each player thinks and plays the game in isolation, prompted by immediate stimuli, which results in this tangle of people running around.

### **3.2 Reflection and analysis as a means of developing mediated bodily action**

Given the quality of the students' initial physical actions, we began the process of operationalizing teaching actions aimed at developing theoretical thinking in collective play, with the intention that physical actions would not be guided by immediate, tangible objects, but rather mediated by theoretical concepts. To this end, we presented a problem for the game that could not be solved by sensory means alone, requiring the development of theoretical concepts and theoretical generalization.

The intention in proposing the problem was to stimulate in students the need and motivation to seek theoretical knowledge in collective play. Students having an active attitude toward knowledge is a condition for them to be engaged in study; thus, it was essential that the proposed tasks could foster the creation of the need-motivation-object relationship, so that the students' actions and operations could be increasingly voluntary and conscious.

In this way, the tasks organized by the teacher/researcher should provide conditions for students to have a conscious relationship with the problem of space occupation in the game. Driven by this intention, the teaching interventions began with reflection on the students' bodily actions, aiming at raising awareness.

We organized the students into four groups of five students each. We provided each group with two photos of themselves playing the game and asked them to identify the problem present in the scene depicted. Two photos showed how the players were positioned on the court. Almost all the players were located near the center line, leaving all other spaces on the field empty. Two other photos showed a player crossing the opponent's court due to the spatial position of the opposing team's players. Yet another photo showed four players in blue vests "frozen" in the opponent's territory, with only one free to perform physical actions, resulting in a considerable disparity in the number of players compared to the other team.

In addition to motivating students to learn, the formulation of the problem also aimed to broaden the students' field of attention and perception, drawing attention to other issues involving the game beyond the objects captured by the senses. In other words, the aim was to prevent students from focusing solely on the flag as the target objective of the competition, providing them with elements for reflection on the game that would enable them to achieve theoretical abstraction.

After allowing time for the groups to discuss the problems they observed in the photographs, a collective discussion was opened during which the students were able to share the impressions of each group. In this sense, the use of photographs was beneficial, as seeing themselves and their classmates created a joyful atmosphere, captured their attention, and facilitated a broader perception of the game. We can say that this resource not only mobilized the students' attention and perception to identify game situations resulting from the occupation of space but also mobilized them emotionally.

The dialogue transcribed below is an example of how students identified the problem brought up by the photo.

*Teacher: What do you see in the photo?*

*Pietra: Lincoln is looking at the other team.*

*Victor: Yes, Lincoln is looking at the other team. And Eduarda's team has four players frozen.*

*Ana: Natalia is looking the other way.*

*Teacher: Excellent. The players on Eduarda's team are all frozen. If they are all frozen, how many players are left to run for the team?*

*Victor, Pietra, and Ana: Just one. Eduarda.*

*Teacher: And was Eduarda able to help the team?*

*Victor: No, because everyone on the other team was running.*

At the end of the discussion, time was set aside for two teams to organize their strategies to play the game again. The teams that were not participating in the game at that moment took on the role of commentators, whose task was to point out the reasons that led one team to victory and the other to defeat and then

convey them to the teams that were playing. Subsequently, the roles were reversed: the two teams of commentators went to the playing field, and those who had just finished playing took on the role of commentators. All students, therefore, had the opportunity to participate as players and commentators.

The commentators received questions prepared by the teacher/researcher to guide their analysis. The questions were intended to direct the students' perception and attention so that they could explain why one team managed to capture the flag and the other failed to defend it. They wrote their analyses so that they could later comment on them to the players. For example: “The red team took the flag because there was no one protecting it; they only focused on two people and not on the rest of the red team” (Franciele); “The yellow team took the flag because the other team had no one. The yellow team passed, and the other team stood still” (Luís Henrique).

In the tactical scheme presented in Figure 3, the concern with seeking numerical equality caused the “frozen” players on the red team to start shouting for the other members to save them. The shouts caused the two members to automatically look back. As they turned their heads back, the shift in focus allowed the yellow team player to take advantage of the situation, cross the court, and win the game.

Figure 3. Game situation: numerical disparity



Source: Authors

We can observe, in the situation described, that the students replicated the situation in the photo, analyzed previously, for the game when they encountered the numerical disparity of players caused by the “freezing” of their team members. The frozen players shouting to be saved, and even the visual response of the other players in relation to them, demonstrate the genesis—albeit incipient—of a concern with issues apart from the exclusive pursuit of the flag, and this translates into a perception that did not exist until then: that there must be a relationship between the players on the team.

The intention was that the problem of perceiving the “frozen” player should not be solved directly (I perceive → I run to save), but that between perceiving and running there should be conceptual mediation: occupation of space. This new element, the theoretical concept, began to mediate psychic processes and bodily actions.

In another class, we organized the teams to perform different functions: one for students to experience the practice of the game, performing analysis within the match, and another for students to play the role of coach and perform external analysis of the game.

We divided the students into four teams, each with five members. Four players would play the match, and the fifth would act as the team's coach. We initially allowed time for discussion of the team's organization, and at the end of the game, we proposed a debate about the process and the results obtained. The coach was allowed to give instructions during the game. There were two questions (which are actually two sides of the same coin) directed at the coach: why the team managed to capture the flag and why the team failed to defend the flag. As we had the opportunity to repeat the lesson on another day, it was possible to rotate, which allowed several students to try out this role, giving them the experience of watching the game from the “inside” and the “outside.”

The experiences of playing the roles of commentator and coach were inspired by Elkonin's (2009) work on social role-playing as an important activity in early childhood education as a means of reproducing human activities that

promote children's learning and development. We observed that, in elementary school, social role-playing can also be relevant in mobilizing students' psychic functions. Playing at being sports commentators and coaches, as they had seen in sporting events, engaged them emotionally and cognitively.

We observed that there were advances in the way they perceived the game and acted in it, but the teams still played in such a way that the distribution of players favored offensive actions. There was still no significant change in the collective organization of the teams. At this point, they already identify that the cause of victory or defeat is related to the way players are distributed on the playing field, that the teams that won had a more balanced defensive system than the teams that lost the game. However, we also noticed that the playing space and collective action had not yet become a problem for the students. New teaching actions were needed for them to move in this direction. Collectively, we used the tactical board to analyze the modes of action in the game and, later, modeling as a means of systematizing planned possibilities for action.

### **3.3 Modeling to develop collective physical action mediated**

The teacher/researcher then gathers the students in a large circle, using the tactical board, and promotes collective discussion to reveal the central problem present in the game.

*Teacher: The goal line in our case is the flag line, and how many players are there here?*

*Students: Five.*

*Teacher: The blue team is on their side here, as if they were at the beginning of the game, and the red team is on their side of the field. I'm going to ask you a question first: when you're playing capture the flag, what are you thinking about? What do you want?*

*Rai: To get the flag.*

*Teacher: To get the flag (and I signal with my hand that it's a point).*

*Franciele: Not to let the other team pass.*

*Teacher: Not to let the other team pass (I signal the second item with my finger). And not to let the other team...?*

*Students: Pass.*

*Teacher: Pass. So they don't get...?*

*Students: The flag.*

*Teacher: Very good. I'm going to try to show you that this is also the objective of the game, but it's not the only one. There's another one that you haven't realized yet. Let's go. I'm going to set up a situation like this (demonstrates on the tactical board). These two players here in red are here in the flag area, and these two are here (in the opposite flag area). I'll put one more here, so there are three here in the flag area. The situation is as follows: there are three in the flag area, right? And here are three blue players defending. Here are two in the flag area (blue) and two red players defending. Has this ever happened in your game?*

*Students: Yes.*

*Pietra: Several times. Teacher: Several times! Eduarda: That's a mistake.*

*Teacher: Why is that a mistake?*

*Eduarda: Because there should have been one here to help him.*

*Luis: Ohhh teacher, there has to be one here, because if there are two, one can throw the flag over the other, and the other can catch it and pass.*

*Franciele: That's true (agreeing with Luis). Teacher: What were you going to say, Pietra?*

*Pietra: Their mistake, because there was one here behind ohh (points to the tactical board) because, like, if one passes him with the flag, the other can catch it. So that's their mistake.*

*Teacher: Look at what Pietra said, everyone. If both are up here, it's not just the guy doing this (draws on the board as if the player were passing by the corner of the court), running really fast from here to there.*

*(After this summary, the students are focused on the board, but thoughtful.)*

*Students: (looking at the board). Teacher: Isn't it easy for him to run here? Students: Yes.*

*Kauan: Yes, very easy.*

*Teacher: In other words, what is all free here? What is free here? (Mark the free spaces on the playing field on the board).*

*Rai: The space.*

*Kauan: Everything.*

*Teacher: (Emphasizing verbally the answer given by Raí). The space. Raí: (finishing the previous answer) for them to pass.*

*Teacher: Very good. So, what have you identified? What is the problem here...?*

*Students: The space.*

*Teacher: How do we solve this? What would we have to do...?*

*(Students approach the board to handle it, causing a commotion).*

*Eduarda: It had to stay more here (moves two pieces on the board, placing each one close to the sideline), and this one had to stay here (places a piece more centrally, doing the same thing with the other team).*

*(Analysis of the possibilities for physical actions in the scheme set up by Eduarda)*

*Teacher: Look, has the space problem been solved now?*

*Students: Yes*

*Teacher: Because if this runs here (handles the blue piece that is in the flag area and moves it to the center of the court)*

*Lara: He catches it.*

*Teacher: So, what if he goes around the corner? (shows on the board) Luís: That one catches it.*

*Teacher: What if he goes around the other corner? (shows on the board)*

*Luis, Raí, and Gustavo: That one catches it.*

*Luis: Teacher, there's a way to pass. Just come here, look (takes the piece that is in the flag area), then you dribble like this, like this, and pass. (demonstrates passing the piece past the opponent).*

*Teacher: And what is this one going to do? (questioning Luis's idea).*

*Luis: He's going to run after it.*

*Teacher: That's right.*

In this collective discussion, it is very interesting to see the students' involvement in interacting with the problem situations presented by the teacher/researcher. The use of the tactical board was fundamental for problematizing the central content of the game and for mobilizing the students' memory, attention, perception, reasoning, imagination, and feelings. Recalling

what they had already experienced in game situations demonstrated on the board, the students remained focused on the discussion for a long time, such was the attention involved in the activity. Their perception turned to the relationships between the various situations that can occur in the game, linked to the teams' occupation of space. The sense of belonging generated by the task was reflected in individual and collective actions, from the act of remaining silent, with their eyes fixed on the blackboard, to the moment when they began to verbalize possibilities, alternatives, ideas, and reasoning. The psychic function of imagination was also stimulated so that they could anticipate and predict new situations.

The questions asked by the teacher/researcher suggested that the team's actions were mediated by the idea of controlling space, with a view to *controlling the physical actions of others*, which involves collective action. The tactical board, according to Shtoff (apud Davidov, 1988), is configured as a material model<sup>5</sup>, as it acts as an object transformation insofar as it resembles the spatial characteristics of the phenomenon.

Throughout the conceptual learning process, the tactical board made it possible to synthesize the relationship between “mutually opposing objectives directed at the same target,” given that the players (pieces) occupy the spaces of the aforementioned object. Although it is not the object in real conditions, the tactical board allows for its transformation. The teacher can also create mental models through semiotic models, such as the representation of 6:0, for example, in handball. (DAVIDOV, 1988).

After working with the tactical board, we proposed a significant increase in

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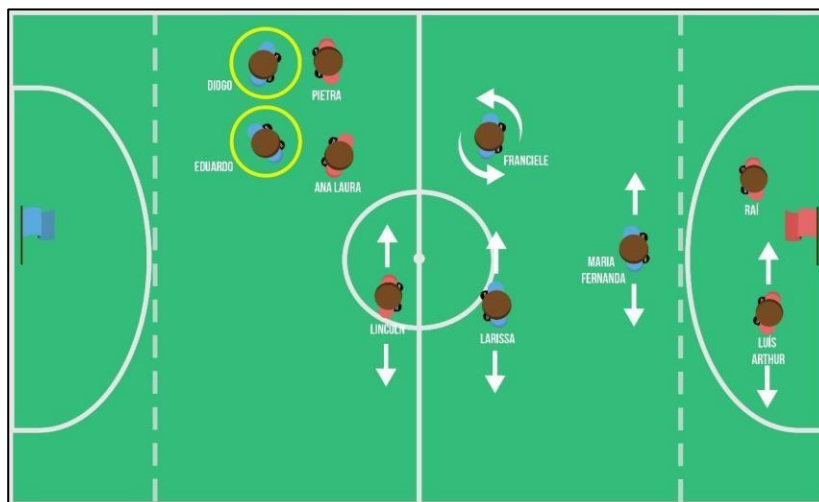
<sup>5</sup> Davidov (1988, p. 313), citing Shtoff, explains that “a model is understood to be a system represented mentally or realized materially which, by reflecting or reproducing the object of investigation, is capable of replacing it in such a way that its study provides us with new information about the object.” The author distinguishes between two types of models: material and mental. Mental models are divided into: 1) models that reflect the spatial particularities of objects (e.g., scale models); 2) models that bear physical resemblance to the original (e.g., a model of a dam); 3) mathematical and cybernetic models that reflect the structural properties of objects. Mental models are divided into: 1) iconographic images (drawings, globes, bars, etc.); 2) semiotic models (e.g., the formula of an algebraic equation, etc.).

the playing space in which this problem could, in fact, be the central element in the organization of physical actions in the game and which could be supported by the object instrument to perform their physical actions. In the scenes shown in Figures 4 and 5, it is possible to see the leap in the students' learning in relation to changes in physical actions in the game.

In Figure 3, we represent the red team's game problem. Diogo and Eduardo from the blue team are frozen in the opponent's field, while Pietra and Ana Laura from the red team occupy the space in such a way that they mark the frozen players so that they cannot be saved.

Luís Arthur and Raí are in the flag area, Maria Fernanda is positioned in front of the area, Franciele and Larissa are positioned parallel to each other closer to the center line. Looking down on the court, the positioning of the players forms a triangle.

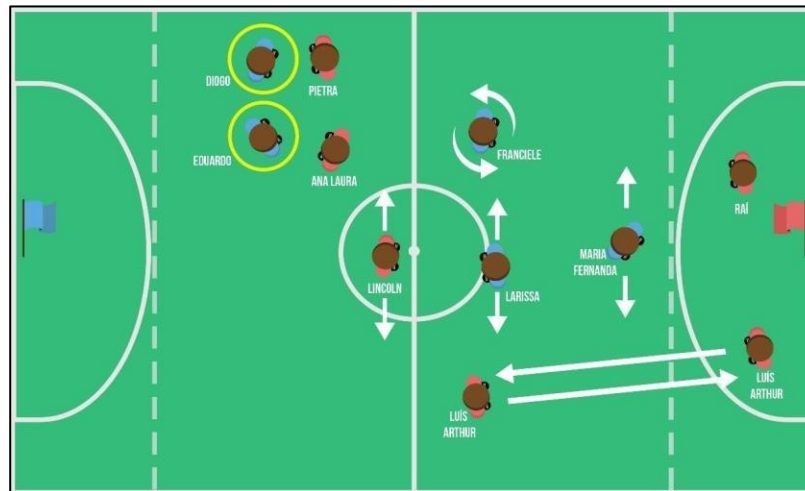
Figure 04. Expansion of game perception



Source: Authors

In Figure 5, the situation is as follows: Luís Arthur, who is in the flag area but does not have possession, attempts to cross the opponent's territory to draw the attention of the defensive players and open up space on the field for Raí to pass the object. However, the defensive players do not attempt to freeze Luiz Eduardo but merely follow his movements using their peripheral vision.

Figure 5. Cooperative bodily actions



Source: Authors

In Figure 05, player Franciele is focused on defensive actions, but now she is also directing her attention to the opposing team's defensive system, which is concerned with protecting the “frozen” players, leaving one player, Lincoln, to perform defensive actions. This player is close to the center line, observing the offensive actions of his team, which is trying to bring the flag into its territory. Franciele notices the situation and signals to Larissa to make her aware that the space on her left side is empty. Larissa then notices this space and crosses the opposing territory, reaching the flag area. Franciele automatically takes on a more central role in the defensive actions.

Figure 6 shows that when Larissa reaches the flag area, the positioning of the opposing team's defensive players changes. Ana Laura stops focusing on the “frozen” players to defend, and Lincoln performs the same physical action, with only Pietra continuing to protect those players. Franciele also changes her positioning after Larissa's attack and watches both sides of the game.

Figure 6. Strategic corporate actions



Source: Authors

The scene shown in figure 06 illustrates the qualitative leap that interaction with theoretical knowledge causes in students' physical and mental actions, demonstrating a conscious mastery of psychic functions (perception, attention, imagination, reasoning, etc.) and, consequently, of bodily actions.

Space and the search for its appropriate occupation are realized in the study activity, mediating the relationship between psychic functions and bodily actions, since between individual action and play there is this new knowledge that modifies the students' perception, attention, imagination, and reasoning, resulting in bodily movements that are qualitatively different from those performed at the beginning of the experiment. Dialectically, immediate individual actions are superseded by mediated actions that include the perception of the game as a collective, considering the group's objective. The search for the flag became a consequence of the analysis of individual and collective situations in the space where the game takes place.

### Final considerations

Our research is based on the concept that it is the role of basic education to provide access to the culture produced by humanity and consolidated in the theoretical content of all areas of knowledge, including Physical Education, as a means of developing theoretical thinking in students.

The defense of an educational organization based on the appropriation of theoretical concepts is opposed to the concept that Physical Education should be purely practical, focused on techniques, but this does not mean that we defend the idea that learning situations should become moments of verbal transmission of concepts by the teacher in a classroom. We believe that these two types of teaching practice do not promote this type of development and, therefore, should be overcome. For this reason, our objective was to investigate the theoretical and methodological conditions capable of generating, through the teaching of theoretical concepts in Physical Education, learning that promotes the development of students' theoretical thinking.

The scientific/theoretical concept is one that synthesizes the needs and means of action of human activity, referred to by Davidov as essential necessary relationships (1988). These essential relationships give integrity to phenomena, encompassing their past, present, and future. The subjects, for their part, once these relationships are revealed, and to the extent that they become aware of this integrity, have their psychological functions and means of interaction modified.

One way to understand the essence of content is to seek the logical-historical path of its genesis and development. In Physical Education, according to Nascimento (2014), the essential relationships are the mastery of one's own bodily action, the control of oppositional bodily action, and the creation of an artistic image. Thus, these theoretical concepts should ultimately be the purpose of the study activity to be formed in the classes of this curricular component.

We understand that teaching the theoretical concepts present in physical culture activities enables student development when their physical actions cease to be immediate and instinctive and become voluntary and mediated by the theoretical concepts present in the activity they are performing, which allows students to consciously master their own physical actions, as well as the actions of others involved in the activity.

Throughout the experiment, we observed that the teaching actions led to changes in the students' actions, revealing that they began to think about the game in a different way. The first physical actions did not yet have the characteristics of a collective activity; that is, there was a team, but the physical actions were thought out and executed individually, which is characterized by a disorganized gathering of the team. The students were guided by the sensitive objects, so the target objective of the game was the flag; this means that the physical actions were strictly focused on taking care of this sensitive object. There was also a disparity between the articulation of the attack-defense system, in that most students were concerned with capturing the flag at the expense of its defense.

The tasks proposed by the teacher/researcher—requiring students to reflect on and analyze their own physical actions, rather than just playing the game—allowed for the emergence of primary forms of strategic and tactical organization in the students, that is, action mediated by theoretical content. Gradually, students began to no longer deal with empirical objects in an immediate way, but mediated their physical action in the game through theoretical concepts, mainly that of occupying space to create a situation of opposition and conscious control of their own physical action (NASCIMENTO, 2014).

The teaching action of leading students to systematize the problem of spatial occupation through a language that allowed greater communication of the game as a whole—in this case, through the use of the tactical board and modeling—enabled students to psychically reflect on the collective activity, recognizing their own individual actions and those of other members of the activity beyond the present time and immediate space.

In addition, the proposal of tasks that required students to plan actions, in view of what was the object of reflection, analysis, and synthesis, enabled the realization of the internal plan of actions specific to a game in which it is necessary to master one's own bodily action and control the opposing bodily action.

In response to our research question, we concluded that the didactic actions that favored theoretical concepts to act as mediators of student actions were: the presentation of learning problems to be solved through the mediation of the concepts under study; collective discussions among students and between students and the teacher; the use of language, in this case modeling, as a means of systematizing abstract relationships present in the particular task performed; the inclusion of new problems that can be solved based on the abstraction expressed in the modeling.

These were teaching actions that, in our experiment, proved to be favorable to learning that promotes student development, but this does not mean that they are the only ones possible. Certainly, other actions also have this formative role, and it would be very welcome for pedagogical practice in this field if new research could reveal them.

It is important to note that, in the presentation of the research, we pointed out the moments when it was possible to observe advances in student learning, when their actions revealed a qualitatively different way of thinking about the game, linked to the teaching actions carried out collectively. However, this does not mean that learning was linear, occurring at all times as desired. Throughout the experiment, as in any teaching process, it was possible to observe advances, setbacks, and stagnation in learning, which made each class a problem to be solved by the teacher/researcher. The problem was expressed in a question that guided our actions: what can be done to help students advance toward physical action mediated by theoretical concepts? This question helped us to evaluate, in a concomitant manner, the teaching and learning actions already carried out, as well as to define when to resume or move forward with a content. Therefore, the path of learning is not linear and marked only by advances, but the teacher's clarity about the desired training is what allows them to act consciously in this process and promote advances in student learning. Highlighting these advances in this article has precisely the objective of looking more and more scientifically at the

organization of teaching, with the aim of ensuring the maximum possibilities for human development through school education.

Finally, it is worth noting that defending work with theoretical knowledge in the field of Physical Education does not mean neglecting physical training or motor skills for the practice of activities related to physical culture. The criticism falls on teaching that fundamentally prioritizes learning technique for technique's sake, as well as teaching that transforms classes into moments of theoretical exposition. We argue that knowledge conceived and developed in the field occurs through physical actions in activity, therefore, its appropriation must occur under the same principle.

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