



Analysis of tactical-technical sports training tasks based on two macrocycles: a successful case of a professional Brazilian women's handball team

Análisis de tareas de entrenamiento técnico-táctico deportivas basadas en dos macrociclos: un caso de éxito de un equipo brasileño profesional de balonmano femenino

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Abstract

Introduction: The analysis of training tasks is an important tool for improving the teaching-learning-training process and tactical-technical performance in team sports, including handball.

Objective: The aim of this study was to analyze tactical-technical sport training tasks across two macrocycles, following a successful case from a professional Brazilian women's handball team.

Methodology: One coach and 18 athletes from a professional handball squad participated in the sample. Ninety training sessions were recorded and coded using the Sistema Integral para el Análisis de las Tareas de Entrenamiento. A total of 490 tasks were analyzed. The first macrocycle covered the preparation for the Super Globe, whereas the second encompassed the preparation for the Brazilian National Handball League. Data were analyzed using descriptive statistics (relative percentage frequency) and inferential statistics (chi-square test, contingency coefficient, and adjusted residuals) in SPSS software.

Discussion: The results showed that, within the training sessions, more time was allocated to tasks involving Collective Tactical-Technical Offensive Behaviors, Group Tactical-Technical Offensive Behaviors, and Group Tactical-Technical Offensive Gestures, developing Complex Application Exercises in situations with opposition, numerical equality tasks, and categories 5 (5v5 or more) and 2 (2v1, 1v1, 2v0, 3v0, 4v0, 5v0, 6v0).

Conclusions: The tasks also presented significant associations between pedagogical variables (type of content and level of opposition) and external load variables (degree of opposition and cognitive involvement), in relation to the training mesocycles throughout the competitive season. Overall, the findings indicated that the training process followed a pattern that prioritized tactical components, followed by technical skills.

Keywords

Sport science; sport pedagogy; tactical and technical training; sport; handball.

Resumen

Introducción. El análisis de las tareas de entrenamiento es una herramienta importante para mejorar el proceso de enseñanza-aprendizaje-entrenamiento y el rendimiento táctico-técnico en los deportes de equipo, incluido el balonmano.

Objetivo. El objetivo de este estudio fue analizar las tareas de entrenamiento táctico-técnico de los macrociclos, siguiendo un estudio de caso exitoso de un equipo profesional brasileño de balonmano femenino.

Método. Participaron en la muestra un entrenador y 18 jugadoras de un equipo profesional de balonmano. Se filmaron y transcribieron noventa sesiones de entrenamiento utilizando el Sistema Integral para el Análisis de Tareas de Entrenamiento (SIATE; Ibañez et al., 2016). Se analizaron un total de 490 tareas (255 del macrociclo 1 y 235 del macrociclo 2). El primer macrociclo abarcó la preparación para el Campeonato Mundial de Balonmano (mesociclos 1 a 4), mientras que el segundo correspondió a la preparación para la Liga Nacional de Balonmano (mesociclos 5 a 8). Los datos fueron analizados mediante estadística descriptiva (frecuencia porcentual relativa) y estadística inferencial (chi-cuadrado, coeficiente de contingencia y residuos ajustados), utilizando el programa SPSS.

Discusión. Los resultados mostraron que, durante las sesiones de entrenamiento, se dedicó más tiempo a las tareas de Conducta Táctico-Técnica de Ataque Colectivo, Conducta Táctico-Técnica de Ataque Grupal y Gestos Táctico-Técnicos de Ataque Grupal. Se desarrollaron ejercicios de aplicación complejos en situaciones de oposición, en condiciones de igualdad numérica y dentro de las categorías 5 (5×5 o más) y 2 (2×1, 1×1, 2×0, 3×0, 4×0, 5×0, 6×0).

Conclusiones. Las tareas también evidenciaron una asociación estadísticamente significativa entre las variables pedagógicas (tipo de contenido y nivel de oposición) y la carga externa (grado de oposición e implicación cognitiva) con los mesociclos de entrenamiento a lo largo de la temporada deportiva. En conjunto, se observó que el proceso de entrenamiento siguió un patrón que priorizó los componentes tácticos, seguidos de las habilidades técnicas.

Palabras-clave

Ciencias del deporte; pedagogía del deporte; entrenamiento táctico y técnico; deporte; balonmano.

Introduction

Among the pedagogical procedures that shape the sport context, the processes of organizing, structuring, and analyzing training have gained increasing prominence. The organization and structuring of sport training are characterized as complex processes that must be systematically developed by coaches across all domains (participation, educational, and performance). This requires critical judgment in selecting content and strategies appropriate to different stages of athlete development (Feu, 2006; Cañadas et al., 2011), due to their importance in both formative and competitive environments (Collet et al., 2009; Saad et al., 2015). Another essential factor in the training environment is the careful periodization of planning and training execution (Mesquita, 2000; Cañadas et al., 2011; Rodríguez et al., 2025), which involves the “[...] division of the training program into shorter periods and training cycles according to established objectives” (Paschoalino & Speretta, 2011, p. 15).

To achieve this, the processes of organizing and structuring must operate alongside training assessment (analysis), since organizing and evaluating training tasks allows for a clearer understanding of what must be done, how it should be carried out, and how to advance within the training process. This provides a clearer perspective on the long-term direction of the team’s development (Cañadas et al., 2010). Thus, if dynamic tasks with progressively increasing (and not necessarily linear) levels of complexity are proposed, athletes may respond more effectively to the planned training process, and the coach may, in turn, better evaluate (through reflective processes) whether the team is achieving the expected outcomes based on the intended training approach (Paschoalino & Speretta, 2011).

Therefore, training analysis that supports coaching practice must be based on objective, valid, and reliable data derived from training plans and/or systematic observation, which makes the analysis of tasks proposed to athletes essential in enhancing sport training and development processes. The planned training tasks are highly complex, involving organizational and pedagogical factors as well as multiple offensive and defensive elements. Thus, it is fundamental that training analysis includes the evaluation of pedagogical, organizational, external load, internal load, and kinematic variables that compose training sessions (Ibáñez et al., 2016).

Consequently, for improved sport development, in-depth analysis—particularly of pedagogical and organizational training variables—allows for more effective planning and impacts the processes of teaching, learning, and training. Moreover, analyzing training and the way a team structures and expresses its game can provide valuable data to support coaches in making decisions regarding both tactical–technical and physical training (Dallegrave et al., 2021; Dallegrave et al., 2024).

In the context of team sports, and specifically regarding handball, the sport stands out for its time constraints and its specific technical–tactical situations, which are considered key elements of performance and strongly influence players’ decision-making processes and, consequently, match outcomes (Nicolosi et al., 2023). In addition, as a sociomotor sport with intense interaction between teammates and opponents (cooperation–opposition), handball presents dynamics characterized by uncertainty among participants during match play (Rigo et al., 2025).

Thus, analyzing pedagogical variables (game situation, goalkeeper presence, phase of play, type of content, specific content, means of initiation, level of opposition) and organizational variables (total time, instructional time, effective time, percentage of use, type of participation, number of players, simultaneous executants, participation value) related to tactical–technical training tasks can generate valuable information for coaches, athletes, and researchers seeking to enhance the training process and sport performance in the modality.

When identifying studies in the literature that address the topic under consideration (training analysis), particularly in handball, it becomes evident that the sport training process has been examined through pedagogical variables (Amorim, 2017; Mendes et al., 2018; Mendes et al., 2020; Dallegrave et al., 2021a,b), organizational variables (Dallegrave et al., 2018; Dallegrave et al., 2021a; Mancha-Triguero et al., 2022), and external load variables (García-Ceberino et al., 2018; Mancha-Triguero et al., 2022). Overall, these investigations have shown, regarding the type of task content, that both tactical–technical behaviors and technical–tactical gestures—especially in collective and small-group situations—have been prioritized. Concerning the means of training, the literature has reported tasks involving games and complex application exercises, as well as situations designed to simulate competitive scenarios. The



tasks have been developed with opposition, mostly emphasizing the attacking phase and incorporating varied numerical relations (equality or superiority), particularly in studies conducted within the Brazilian handball context (Amorim, 2017; Mendes et al., 2018; Mendes et al., 2020; Dallegrave et al., 2021a,b).

Among the studies that evaluated organizational variables, findings related to total time, instructional time, and effective time of training tasks show longer durations allocated to tactical behaviors, numerical equality situations, the attacking phase, tasks with opposition, and game-based or complex application exercises (Dallegrave et al., 2018; Mendes et al., 2020; Dallegrave et al., 2021a). Regarding the type of athlete participation within tasks, research has observed that technical–tactical gestures tend to be performed consecutively, whereas tactical–technical behaviors vary between consecutive, alternating, and simultaneous formats (Dallegrave et al., 2021a; Mancha-Triguero et al., 2022). Furthermore, investigations on handball based on external load variables have shown, in most studies, moderate cognitive involvement, numerical equality or +1superiority in the degree of opposition, and playing-space configurations varying between small-sided areas, half court, and full court (Garcia-Ceberino et al., 2018; Mancha-Triguero et al., 2022).

Given these findings, it is evident that research has advanced the understanding of training analysis in handball teams, both in Brazilian and international contexts. Nonetheless, a gap persists regarding the observation of training in adult and professional teams, highlighting the scarcity of investigations at this level. Recognizing the importance attributed to studies on this topic and aiming to contribute to the expansion of knowledge on the specificities of handball, the objective of the present study is to analyze tactical–technical sport training tasks across two macrocycles, following a successful case from a professional Brazilian women’s handball team.

It is worth noting that leagues in South, Central, and North America—especially the Brazilian league—are highly competitive and often serve as pathways for players transitioning to European leagues. Moreover, the team investigated in this study is recognized as a successful and representative reference in its context, given its national achievements and, particularly, its international relevance, such as its participation and results in the South American Championship (champion) and in the Women’s Handball Super Globe (3rd place) during the season analyzed. This performance highlights the effectiveness of the team’s game model and its underlying training process.

Methods

The study was classified as applied, descriptive, quantitative, and based on a case study design (Ato et al., 2013).

Participants

The case investigated in this research concerns the Associação Atlética Universitária, located in the municipality of Concórdia, Santa Catarina, Brazil, founded in 2005. Since its establishment, the club has achieved notable results in state, national, and international competitions. In addition to collective achievements, the team stands out for its number of athletes selected for the Brazilian national teams in both youth and senior categories, including one athlete who won the Senior Women’s Handball World Championship in 2013. Another relevant aspect is that the coach has previously trained both the Brazilian youth and senior women’s national teams and also served as head coach in one edition of the Olympic Games.

The study sample comprised the head coach, aged 57, a former professional handball player who had previously led the Brazilian national team at the Athens 2004 Olympic Games, and 18 players from a professional Brazilian women’s handball team, with a mean age of 23 years and an average of 11 years of experience in the sport. Five of these athletes had already been selected for the senior Brazilian national team, and one for the Paraguayan senior national team. It is important to highlight that all participants were involved in the sports training process and in official matches during the 2019 season. The team was selected through intentional non-probabilistic sampling (Guimarães, 2012), considering its relevance in the national handball context.



Procedures

The research project was approved by the Human Research Ethics Committee (CEPSH – approval number 3.266.666). Data collection lasted eight months, from April to July (first macrocycle) and from August to December (second macrocycle) of 2019. Training sessions were recorded using a camera mounted on a tripod, positioned in the stands of the sports hall (on one side and on the upper level), providing a full view of the court.

Ninety training sessions were recorded and stored on an external hard drive, and subsequently analyzed using a systematic observation technique. The information was transcribed using a recording sheet based on the Sistema Integral para el Análisis de las Tareas de Entrenamiento (SIATE; Ibañez et al., 2016). SIATE enables the analysis of training-related information based on interconnected pedagogical and performance contexts, as illustrated in Figure 1 (Ibañez et al., 2016).

Figure 1. SIATE variables.

TYPE OF CONTENT	DESCIRPTION
Pedagogical variables	
Offensive Group Technical-Tactical Actions (OGTTA) Offensive Team Technical-Tactical Actions (OTTTA) Individual Offensive Technical-Tactical Actions (IOTTA) Offensive Group Tactical-Technical Behaviors (OGTTB) Offensive Team Tactical-Technical Behaviors (OTTTB) Individual Offensive Tactical-Technical Behaviors (IOTTB) Defensive Group Tactical-Technical Behaviors (DGTTB) Defensive Team Tactical-Technical Behaviors (DTTTB) Individual Defensive Tactical-Technical Behaviors (IDTTB)	Technical offensive action involving 2 to 5 players Technical offensive action involving the whole team Individual technical offensive action Tactical offensive behavior involving 2 to 5 players Tactical offensive team behavior Individual tactical offensive behavior Tactical defensive behavior involving 2 to 5 players Tactical defensive team behavior Individual tactical defensive behavior
Training means	
Simple Application Exercise (SAE) Complex Application Exercise (CAE) Non-Specific Simple Game (NSSG) Specific Simple Game (SSG) Modified Sport Sport Mental practice/rehearsal	Technical drill with one athlete Technical-tactical drill with two or more athletes Modified game without the formal structure of the sport Modified game retaining the sport's main structure Sport-specific game with modifications Formal game Cognitive discussion practice with athletes
Level of opposition	
No opposition With static obstacles With modulated obstacles With opposition	

Source: Adapted from Ibañez et al. (2016).

Regarding the scientific validity of SIATE, both validity and reliability reached scores above 0.88, analyzed using Cohen's Kappa and the multirater Kfree indices, while internal consistency obtained a score of 0.76, assessed through Cronbach's α coefficient (Ibañez et al., 2016). To ensure greater reliability of the instrument in this investigation, intra- and inter-rater analyses were conducted by a doctoral student and a researcher with a Master's degree in Human Movement Sciences, both of whom participated in the analysis of the sports training tasks. It is important to highlight that the researchers had experience (sport-specific, academic, and professional) in team sports, particularly basketball and handball. To validate the application of the assessment forms, three training sessions were analyzed and evaluated using the Kappa test, considering the intra- and inter-rater agreement of the data analysis form. With regard to the training session analyses, the results showed agreement indices ranging from 0.81 to 1.00, thus indicating "almost perfect" agreement (Landis & Koch, 1977).

Data analysis

Initially, the video-recorded training information was transcribed into Excel according to the SIATE contexts and variables. A total of 490 tasks were analyzed, with 255 in macrocycle 1 and 235 in macrocycle

2. The analysis of tactical training data was divided into two stages. The first macrocycle included the team's preparation for the Super Globe, equivalent to the Handball Club World Championship, held in the first week of August 2019 (mesocycles 1 to 4). The second macrocycle involved preparation for the National Handball League (mesocycles 5 to 8), which began at the end of August and concluded in early December 2019. The information related to the sports training process and the tactical-technical performance factors in handball was subjected to normality tests (Kolmogorov-Smirnov and Shapiro-Wilk, $p \leq 0.001$), which indicated that the data did not follow a normal distribution. The results of the sports training process were based on descriptive statistics (relative percentage frequency) and inferential statistics (Chi-square, contingency coefficient, and adjusted residuals - AR). The IBM SPSS® 23.0 software for Windows was used, adopting a significance level of 5% for the inferential analyses. Excel was used to distribute the data regarding the time allocated to the development of action-related variables during the training sessions.

Results

When examining the level of association between the pedagogical and external-load variables and the training mesocycles, it is important to highlight that mesocycles M1 to M4, corresponding to macrocycle 1, preceded the Club World Championship, whereas mesocycles M5 to M8 (macrocycle 2) were conducted during the months in which the team participated in the National Handball League. Table 1 presents the level of association between content type and the season's mesocycles, revealing a statistically significant association ($p < 0.001$) between technical-tactical gestures and three different mesocycles: IOTTA in M2 (70%/AR=3,8); OGTTA in M1 (22,2%/AR=4,2); and OTTTA in M7 (35,7%/AR=2,5). Regarding technical-tactical behaviors, greater predominance was observed for IOTTB in M7 (50%/AR=2,2), OGTTB in M2 (27,7%/AR=2,1), DGTTB in M7 (35%/AR=2,9), and DTTTB in M5 (22,5%/AR=2,3) and M8 (19,1%/AR=2,2).

In practical terms, both technical gestures and tactical behaviors illustrate a non-linear variation of exercises, demonstrating that the coach structured a training process centered on technical emphasis during the initial mesocycles and progressively shifted toward a tactical emphasis in the subsequent phases.

Table 2 shows that the results did not indicate differences in the association between the means and the training mesocycles ($p = 0.253$), and therefore no differences were found in the distribution of tasks. Nonetheless, it is possible to note that the tasks that were slightly more emphasized included CAE in M2 (19,8%/AR=-2,0) and M7 (14,8%/AR=2,2), as well as adapted sport in M2 (50%/AR=2,2). Thus, the absence of associations between training means and mesocycles may be explained by the fact that CAEs were largely developed as the priority training tasks. Overall, this highlights that the vast majority of exercises were focused on group dynamics that characterized tactical and technical situations (CAE).

Table 3 presents the data on the statistically significant association ($p < 0.001$) between level of opposition and the training mesocycles across the competitive season, highlighting actions within the categories: no opposition in M1 (21,2%/AR=2,9), M6 (6,7%/AR=2,3), and M7 (18,2%/AR=2,3); static obstacle in M2 (35,5%/AR=3,3); modulated opposition in M1 (31,3%/AR=4,0); and full opposition in M3 (11,5%/AR=2,0) and M5 (19,1%/AR=2,1). It is evident that variations occurred across all levels of opposition throughout the mesocycles analyzed, with AR values showing more tasks with no opposition and with full opposition. This trend aligns with the associations observed between content type and mesocycles in Table 1 (more OGTTA, OGTTB, and OTTTB situations), which are reinforced by the current results in Table 3. Together, these findings show a variation between tactical and technical tasks throughout the season's mesocycles. This confirms in practice that the coach emphasized the development of technical capacities at the beginning of the season and subsequently progressed toward the development of tactical behaviors throughout the later mesocycles.

Table 1 Level of association between type of content and training mesocycles.

Variables	Mesocycles																								p-value		
	M1			M2			M3			M4			M5			M6			M7			M8					
Type of content	n	%	AR	n	%	AR	n	%	AR	n	%	AR	n	%	AR	n	%	AR	n	%	AR	n	%	AR	n	%	AR
IOTTB	0	00,0	-0,8	2	50,0	10,4	0	00,0	-0,6	0	00,0	-0,6	0	00,0	-0,8	0	00,0	-0,6	2	50,0	20,2	0	00,0	-0,8			
IDTTB	0	00,0	-0,9	0	00,0	-1,2	1	20,0	00,9	0	00,0	-0,7	0	00,0	-0,9	1	20,0	10,1	1	20,0	00,4	2	40,0	10,9			
IOTTA	0	00,0	-1,3	7	70,0	30,8	1	10,0	00,2	0	00,0	-0,9	0	00,0	-1,3	0	00,0	-0,9	2	20,0	00,6	0	00,0	-1,2			
OGTTB	16	12,3	-0,9	36	27,7	20,1	10	70,7	-0,3	10	70,7	-0,1	20	15,4	00,3	12	90,2	00,8	12	9,2	-1,2	14	10,8	-0,6	<0,001		
DGTTB	5	25,0	10,3	0	00,0	-2,4	0	00,0	-1,4	3	15,0	10,2	2	10,0	-0,6	0	00,0	-1,3	7	35,0	20,9	3	15,0	00,4			
OGTTA	48	22,2	40,2	40	18,5	-1,3	16	70,4	-0,7	19	80,8	00,6	30	13,9	-0,4	17	70,9	00,2	25	11,6	-1,0	21	90,7	-1,5			
OTTTB	0	00,0	-4,3	17	19,1	-0,5	11	12,4	10,5	6	60,7	-0,5	20	22,5	20,3	7	70,9	00,1	11	12,4	-0,3	17	19,1	20,2			
DTTTB	0	00,0	-0,4	0	00,0	-0,5	0	00,0	-0,3	1	10,0	30,4	0	00,0	-0,4	0	00,0	-0,3	0	00,0	-0,4	0	00,0	-0,4			
OTTTA	2	14,3	00,0	2	14,3	-0,6	2	14,3	00,8	0	00,0	-1,1	0	00,0	-1,6	0	00,0	-1,1	5	35,7	20,5	3	21,4	10,1			

Legend: IOTTB: Individual Offensive Tactical-Technical Behaviors; IDTTB: Individual Defensive Tactical-Technical Behaviors; IOTTA: Individual Offensive Technical-Tactical Actions; OGTTB: Offensive Group Tactical-Technical Behaviors; DGTTB: Defensive Group Tactical-Technical Behaviors; OGTTA: Offensive Group Technical-Tactical Actions; OTTTB: Offensive Team Tactical-Technical Behaviors; DTTTB: Defensive Team Tactical-Technical Behaviors; OTTTA: Offensive Team Technical-Tactical Actions; AR: Adjusted Residuals.

Source: collected data (2025).

Table 2 Level of association between training means and training mesocycles

Variables	Mesocycles																								p-value		
	M1			M2			M3			M4			M5			M6			M7			M8					
Training means	n	%	AR	N	%	AR	n	%	AR	N	%	AR	n	%	AR	n	%	AR	n	%	AR	n	%	AR	n	%	AR
SAE	8	16,7	00,4	13	27,1	10,0	3	60,3	-0,5	5	10,4	00,7	4	80,3	-1,3	5	10,4	00,8	5	10,4	-0,6	5	10,4	-0,4			
CAE	63	15,6	00,9	80	19,8	-2,0	33	80,1	00,0	30	70,4	-1,0	63	15,6	10,2	28	60,9	-1,2	60	14,8	20,2	48	11,9	-0,3			
NSSG	0	00,0	-0,4	0	00,0	-0,5	0	00,0	-0,3	1	10,0	30,4	0	00,0	-0,4	0	00,0	-0,3	0	00,0	-0,4	0	00,0	-0,4	00,253		
Modified sport	0	00,0	-1,3	5	50,0	20,2	1	10,0	00,2	1	10,0	00,2	0	00,0	-1,3	1	10,0	00,3	0	00,0	-1,2	2	20,0	00,8			
Sport	1	40,2	-1,5	6	25,0	00,4	3	12,5	00,8	2	80,3	00,1	5	20,8	00,9	3	12,5	00,9	0	00,0	-2,0	4	16,7	00,7			
Mental practice	1	50,0	10,4	1	50,0	10,0	0	00,0	-0,4	0	00,0	-0,4	0	00,0	-0,6	0	00,0	-0,4	0	00,0	-0,6	0	00,0	-0,5			

Legend: SAE: Simple Application Exercise; CAE: Complex Application Exercise; NSSG: Non-specific Simple Game; AR: Adjusted Residuals.

Source: collected data (2025).

Table 3.

Variables	Mesocycles																								p-value		
	M1			M2			M3			M4			M5			M6			M7			M8					
Level of opposition	n	%	AR	n	%	AR	n	%	AR	n	%	AR	N	%	AR	n	%	AR	n	%	AR	n	%	AR	n	%	AR
No opposition	35	21,2	20,9*	25	15,2	-2,4	10	6,1	-1,2	14	80,5	00,3	26	15,8	00,4	11	60,7	20,3*	30	18,2	20,3*	14	80,5	-1,7			
Static obstacles	14	18,4	10,0	27	35,5*	30,3	8	10,5	00,8	6	70,9	00,0	4	50,3	-2,5	5	60,6	-0,4	1	10,3	-3,4	11	14,5	00,7	<0,001		
Modulated obstacles	20	31,3	40,0*	11	17,2	-0,9	1	10,6	-2,1	7	10,9	00,9	7	10,9	-0,9	2	30,1	-1,4	8	12,5	-0,2	8	12,5	00,1			
With opposition	3	10,6	-6,3	41	22,4	00,5	21	11,5	20,0*	12	60,6	-0,9	35	19,1	20,1*	19	10,4	10,8	26	14,2	00,4	26	14,2	10,1			

Legend: AR: Adjusted Residuals.

Source: collected data (2025).

Table 4 shows the level of association between degree of opposition and the training mesocycles of the competitive season. A statistically significant association was found ($p < 0.001$), in which the most prominent categories were no opposition in M1 (21,9% / AR = 4,0) and +2superiority in M5 (31,0%/AR=3,1). It can be observed that the focus on actions without opposition - therefore, more tech-



nical and analytical - occurred in M1, demonstrating the priority placed on refining the technical fundamentals of the game at the beginning of the macrocycle’s training process, whereas the other categories were distributed across the remaining mesocycles of the season.

One aspect that deserves emphasis is that tasks performed in numerical equality followed a relatively linear pattern over the course of the training process, as they did not receive any specific AR. However, it is important to highlight that, despite the absence of AR significance, numerical equality was one of the most frequently trained categories across the analyzed mesocycles. This further reinforces the emphasis on tasks that aim to provide game-like experiences and promote optimal decision-making in situations that closely resemble those encountered during actual match play.

Table 5 shows a statistically significant association between cognitive involvement and the training mesocycles ($p = 0.009$), with greater emphasis on category 1 in M2 (72,7%/AR=4,2); category 2 (2v1, 1v1, 2v0, 3v0, 4v0, 5v0, 6v0) in M1 (19,0%/AR=2,3); and category 5 (5v5 or more) in M3 (14,1%/AR=2,1) and M5 (21,8%/AR=2,0). These results indicate that the team developed a variation of tasks across categories 2, 3, 4, and 5, emphasizing a diversified workload aimed at exposing players to a range of situations that may arise during match play.

Thus, a predominance of more technical tasks was observed at the beginning of the competitive season to promote an analytical improvement of movement patterns in the actions performed. Conversely, OTTTA tasks were more frequently developed in M7, as the team approached the decisive phase of the second target competition. This can be justified by the coach’s possible intent to construct or refine specific technical aspects of the team in preparation for the tournament’s final stage.

Because the team tended to play more frequently and for longer durations - generally seeking to adapt and structure the training process with an emphasis on cognitive engagement and enhanced decision-making - the approach was, in some ways, moving counter to what is advocated in team sports pedagogy. Collective sports aim to foster game construction through decision-making and athlete adaptation to the various problem situations inherent to the game (Galatti & Paes, 2007; Greco et al., 2012). This highlights the need for the training process to be adapted and oriented toward tactical situations, since it is through these experiences that athletes develop the broader capacity to play the game and make appropriate decisions when confronted with the problem-situations characteristic of formal competition.

Table 4 Level of opposition between degree of opposition and training mesocycles.

Variables	Mesocycles																								p-value		
	M1			M2			M3			M4			M5			M6			M7			M8					
Degree of opposition	n	%	AR	n	%	AR	n	%	AR	n	%	AR	N	%	AR	N	%	AR	n	%	AR	n	%	AR			
No opposition	54	21,9	4,0*	50	20,2	-0,5	20	8,1	0,1	20	8,1	0,1	30	12,1	-1,6	17	6,9	-0,5	31	12,6	-0,4	25	10,1	-1,3			
+3sup	2	25,0	00,8	3	37,5	10,1	0	00,0	-0,8	0	00,0	-0,8	1	12,5	-0,2	1	12,5	00,5	1	12,5	-0,1	0	00,0	-1,1	<0,001		
+2sup	6	14,3	-0,2	8	19,0	-0,3	0	00,0	-2,0	2	40,8	-0,8	13	31,0	30,1*	1	20,4	-1,3	7	16,6	00,7	5	11,9	00,0			
+1sup	10	17,2	00,4	10	17,2	-0,8	6	10,3	00,7	4	60,9	-0,3	5	80,6	-1,4	7	12,1	10,4	9	15,5	00,6	7	12,1	00,0			
Igualdade	3	20,2	-5,0	33	24,3	10,0	14	10,3	10,1	13	90,6	0,8	23	16,9	00,9	11	80,1	00,3	17	12,5	-0,3	22	16,2	10,8			

Legend: +3sup: Numerical superiority of three players; +2sup: Numerical superiority of two players; +1sup: Numerical superiority of one player; AR: Adjusted Residuals.
Source: collected data (2025).

Table 5 Level of association between cognitive implication and training mesocycles.

Variables	Mesocycles																								p-value
	M1			M2			M3			M4			M5			M6			M7			M8			
Cognitive implication	n	%	AR	N	%	AR	N	%	AR	n	%	AR	n	%	AR	n	%	AR	n	%	AR	n	%	AR	
Category 1	1	90,1	-0,6	8	72,7	40,2	0	00,0	-1,0	0	00,0	-1,0	1	90,1	-0,5	0	00,0	-1,0	1	90,1	-0,4	0	00,0	-1,2	00,009
Category 2	48	19,0	20,3	49	19,4	-0,9	20	70,9	-0,2	21	80,3	00,3	33	13,1	-1,0	19	70,5	00,0	36	14,3	00,7	26	10,3	-1,2	
Category 3	18	20,5	10,4	20	22,7	00,4	5	50,7	-0,9	6	60,5	-0,4	12	13,6	-0,3	8	90,1	00,6	10	11,4	-0,6	9	10,2	-0,6	



Category 4	8	12,7	-0,6	13	20,6	-0,1	4	60,3	-0,6	5	70,9	00,0	9	14,3	-0,1	3	40,8	-0,9	11	17,5	10,1	10	15,9	10,0
Category 5	1	10,3	-3,8	14	17,9	-0,8	11	14,1	20,1	7	90,0	00,4	12	21,8	20,0	7	90,0	00,5	7	90,0	-1,2	14	17,9	10,8

Legend: Category 1 = 1v0; Category 2 = 2v1, 1v1, 2v0, 3v0, 4v0, 5v0, 6v0; Category 3 = 3v3, 3v2, 2v2, 4v2, 5v2; Category 4 = 5v4, 4v4, 4v3, 6v4; Category 5 = 5v5 or more; AR: Adjusted Residuals.

Fonte: collected data (2025).

Discussion

This study aimed to analyze the tactical–technical sports training tasks of two macrocycles, following a successful case of a professional Brazilian women’s handball national team. The results revealed the process of constructing tactical–technical training tasks, contributing to the Brazilian and international handball landscape with respect to planning future competitive seasons.

Emphasis on type of content across different phases

The main information revealed by the Adjusted Residuals (AR) indicated a predominance of training tasks focused on gestural development (OGTTA) in M1. As a result, more technical tasks were predominant at the beginning of the competitive season. In contrast, OTTTA tasks were more frequently performed in M7, as the decisive phase of the second target competition approached. It is noteworthy that the two months in which this category (OTTTB) stood out were M5 and M8, indicating that tactical actions were more intensively developed during the competition period, across all categories (individual, group, and team).

The initial predominance of technical tasks (OGTTA) can be explained by the fact that the team was at the beginning of its preparation process for the first target competition, which took place at the end of M4, aiming for analytical refinement of movement execution. The emphasis on OGTTB and OTTTB during the competitive and decisive phase (M5, M7, M8) may be attributed to the coach’s intent to build or correct technical aspects for the final stage of the tournament, adapting and structuring the training process based on cognitive development and improving players’ decision-making. It is important to highlight that the training process must be adapted and centered on tactical situations, as these provide broader experiences that enhance players’ ability to perform and make better and faster decisions in response to problem situations inherent to formal match play (Morales et al., 2009; Moreira et al., 2013; Dallegrave et al., 2017; Jaramillo et al., 2026).

Several scientific investigations in other sports - such as futsal (Saad, 2002), handball (Mendes, 2006), volleyball (Ramos, 2007; Donegá, 2007; Collet et al., 2008), basketball (Cañadas & Ibañez, 2010) and football (Gamero et al., 2009) - have also identified the development of training tasks based on technical fundamentals (OGTTA). However, this emphasis runs counter to what team sports inherently propose: building the game through decision-making and players’ adaptation to the problems presented during play (Galatti & Paes, 2007; Greco et al., 2012). Specifically in handball, the literature (Amorim, 2017; Mendes et al., 2018; 2020; Mancha-Triguero et al., 2021) still reports a high representation of gestural–technical content (technical skills and abilities) in training tasks without opposition and involving individual or small-group technical–tactical gestures. On the other hand, these same studies have shown increasing adaptation of the training process toward content related to tactical–technical behaviors, both in group and team situations, reflecting coaches’ growing concern with emphasizing these tactical components.

Training means

In the present study, it was observed that the coach prioritized tasks based on the Set of Chained Actions (SCA) during training sessions, followed by the Set of Specific Actions (SSA) and sport-specific activities. The coach of the investigated team aligns with the approach adopted by coaches of the Brazilian national teams, considering that the categories analyzed in those squads (U-18 and U-19) are essentially transitioning into the professional competitive environment. However, it is important to note that SCA tasks, due to the lack of continuity of natural game actions, may affect team behavior during matches, as the action ends after the attack is defined, without the defensive or offensive transition phases that would

occur in real-game situations. As a result, the training priority shifts toward developing actions rooted in a positional and organized attack structure.

The findings of this investigation corroborate the results reported by Mendes et al. (2020) in a study with U-18 and U-19 developmental athletes from the Brazilian handball national teams, which also identified CAE as the primary training means, followed by SAE and formal sport. Studies in other team sports have observed different training emphases. For example, in basketball, SAE tasks have been used predominantly in 1v0 and offensive situations, while Specific Simple Games (SSG) occurred in the defensive phase, and the training process was structured around SSG tasks in various formats (3v3, 4v4, 5v5). In handball, another study with youth categories found that exercises were used to refine technical skills, whereas game-based tasks were applied to develop tactical aspects (Dallegrave et al., 2021b), highlighting differences across age groups within the same sport. Similarly, Amorim (2017), also focusing on handball, observed that most tasks were developed through simple and complex game-based activities, demonstrating coaches' concern with providing athletes with specific experiences inherent to the sport.

Level and degree of opposition

It was observed that different forms of development of the variable level of opposition were employed. A specific finding is that modulated opposition achieved the highest AR (4.0) across the season's mesocycles. Regarding the association between the external load variable degree of opposition and the mesocycles, the importance of alternating the degree of opposition for players was evident, enabling the development of situations of equality, +1superiority, and +2superiority during training.

This variation in the level of opposition can be justified because it reflects the intensity players will encounter in formal matches, as well as key characteristics of invasion sports, which are based on cooperation and opposition. The increased use of modulated opposition, particularly in M1 (the initial and preparatory phase), may be explained by its capacity to provide a level of opposition controlled by the coach, in which defenders merely accompany or constrain the attacking process (Ibáñez et al., 2016), but without directly intervening to regain possession. This serves as a motivational component and allows exploration of different offensive possibilities. Additionally, a fundamental principle of handball is the high likelihood of numerical imbalance caused by exclusions, making the alternation of opposition levels (equality, superiority) essential in training.

In the context of the association between level of opposition and the training mesocycles, it was found that different forms of developing this variable were employed, which aligns with findings from studies in football (Gamero et al., 2019), basketball (Cañadas et al., 2015; Cagamero et al., 2020), and handball (Amorim, 2017; Mendes et al., 2020). All these studies identified statistically significant differences for the variable level of opposition, as well as technical priorities (no opposition, static obstacle, and modulated opposition) and tactical priorities (modulated opposition and full opposition) in training tasks. Research in handball has highlighted a greater emphasis on actions with opposition, indicating that training has increasingly addressed components of the formal game by providing situations with real opposition (Dallegrave et al., 2021b; Mancha-Triguero et al., 2022).

Regarding the association between the external load variable degree of opposition and the analyzed mesocycles, the findings converge with those reported in basketball studies (García-Ceberino et al., 2020; Cáceres-Sánchez et al., 2021) and handball research (Mancha-Triguero et al., 2022), which found statistically significant differences. The study by Mancha-Triguero et al. (2022) identified a greater emphasis on +1superiority and equality actions, demonstrating the focus of training tasks based on these categories, whereas Cáceres-Sánchez et al. (2021) reported higher relevance for equality actions, developed through small-sided games or full-team play. In contrast, the research by García-Ceberino et al. (2018) did not find statistically significant differences for the variable degree of opposition. However, the number of tasks conducted in the training session indicated a focus on actions without opposition and numerically equal situations, which aligns with the present investigation. Overall, the findings of this study are consistent with the existing literature, demonstrating the coach's concern with developing actions that address more fundamental aspects of the game (technique without opposition) and aspects more closely related to game understanding (tactics in equality or superiority situations).

Cognitive implication

When considering cognitive involvement, the evidence shows that the coach developed tasks with lower complexity at certain moments of the training session (category 2) and, at other moments, shifted to tasks that more closely reflected the real game environment (categories 3, 4, and 5). The results reflect the purpose of cognitive involvement, since 5v5 actions or those with larger numbers are inherently more complex and consequently emphasized for longer periods within training tasks and sessions.

When more complex processes are implemented by coaches, players are required to demonstrate greater problem-solving capacity and adaptability to game situations. It is also noteworthy that tasks with high levels of complexity—those that impose difficulties and progressively incorporate more elements of the sport (Ibáñez et al., 1999; 2016) - become increasingly relevant within the training process. Thus, when a training process centered on tactical actions is developed, players tend to exhibit improvement when facing the inherent problems of the game, as well as enhanced decision-making (Moreira et al., 2013; Dallegrave et al., 2017). However, this scenario cannot be homogenized to the point that training becomes exclusively tactical; instead, training should create an environment that addresses all specificities of each sport, resulting in a training process with a systemic approach (Cañadas et al., 2015; Ibáñez et al., 2015; Mendes et al., 2018).

Although little of the literature reviewed has focused on observing and analyzing cognitive involvement, the present study provides findings aligned with current research. A study in basketball found a significant association between cognitive involvement and phases of play, with greater emphasis on categories 3, 4, and 5 (situations with partial or full opposition) during mixed-play phases (attack and defense simultaneously) (García-Ceberino et al., 2020). Conversely, other studies in basketball (Cáceres-Sánchez et al., 2021) found significant statistics for simpler situations, developed through individual actions or without direct opposition (categories 1 and 2), while research in handball (Mancha-Triguero et al., 2022) identified a predominance of formal whole-team play situations (7v7). Thus, the findings of this investigation are important as they highlight the relevance of cognitive involvement in the training environment, particularly when more complex processes are employed.

In this sense, the results and discussion emphasize this study's contribution to handball, both within the South American context and the global scenario, as it illustrates two distinct macrocycles of a successful Brazilian team throughout a complete season. It demonstrates how the process of designing technical-tactical training tasks is developed, and it may contribute to the national and international handball landscape by informing planning approaches for future seasons.

Conclusions

To address the research objective, this investigation showed that, during the training sessions, more time was allocated to OTTTB, OTTTA, and OGGTA tasks, which developed CAE in opposed situations, in tasks with numerical equality, and within categories 5 (5v5 or more) and 2 (2v1, 1v1, 2v0, 3v0, 4v0, 5v0, 6v0). The tasks also showed statistically significant associations between pedagogical variables (type of content and level of opposition) and external load (degree of opposition and cognitive involvement), and the training mesocycles throughout the competitive season. The evidence indicates that the training process followed a pattern that prioritized tactical components, followed by technical skills. In addition to demonstrating the coach's concern with emphasizing training that reflected possible game situations that players would encounter in formal competition, the findings also revealed that he sought to maintain tasks in which players performed actions to improve their technical abilities.

Limitations

From a methodological standpoint, this study presents limitations that should be considered, particularly the exclusive reliance on training-session records obtained through video analysis and the partial use of SIATE variables. Although SIATE is a validated instrument widely applied in research, not all of its variables were used due to the way the results emerged throughout the analyses, making it necessary to make decisions regarding the number of variables to be investigated and the need to focus on those



most directly aligned with the study's objectives. This decision narrowed the scope of the analysis and may have restricted a more complex understanding of the training process. Moreover, no interviews, focus groups, or other qualitative techniques were conducted with the coach or coaching staff, which might have provided important complementary information about pedagogical decisions and the strategies used to design training tasks.

Regarding the generalization of results, it is important to note that this is a case study conducted with a specific professional team recognized for its successful trajectory in both national and international contexts. Therefore, caution is advised when extending these findings to other settings, given the specificity of the sporting reality and the national context in which the team is situated.

Despite these limitations, the study demonstrates strong potential for analyzing training tasks within mesocycles of two major macrocycles of the competitive season - one prior to an international tournament (a concentrated competitive period) and another during a national competition (a prolonged competitive period). As such, this investigation may contribute to the academic and scientific community by presenting findings on the sports training process across an entire season of a professional Brazilian women's handball team. By providing data on tactical-technical periodization, it may foster new perspectives for structuring sports training throughout the season, particularly given the scarcity of this type of research in the Brazilian context.

For future research, it is recommended to use the full SIATE instrument to allow for a more in-depth analysis of tactical-technical training, including internal load and kinematic variables. Additionally, instruments for assessing athletes' motivation and the coach's behaviors during training and competition, using memory-stimulated recall techniques, should be incorporated. A qualitative approach is also suggested to better complement the analyses, enabling the identification of the coach's beliefs and relevant data regarding decision-making processes related to training structure and the team's game model.

Practical Applications

Based on the proposal presented, it is evident that this task-planning model can be replicated in any team sport seeking to establish a structured framework to guide its competitive season.

In this sense, the proposed task model may be adapted to other contexts and sport modalities. Initially, the target competitions in which the team intends to participate must be selected, allowing the coaching staff to determine the available preparation and training time. From that point on, it becomes possible to design the training process across macrocycles (quarterly, semiannual), mesocycles (monthly), and microcycles (weekly). For professional categories, it is suggested that approximately 70% to 75% of tasks emphasize the development of group and team tactical behaviors, whereas 30% to 25% of tasks focus on technical abilities. At this level, the earlier athletes acquire a comprehensive understanding of the game, the faster the team will progress throughout the competitive season.

Regarding the Brazilian context, it is important to highlight that all variables of the task-planning model can be replicated. However, it is essential that the coaching staff define the intended game model before designing the tasks—considering not only how the team aims to play, but also who is playing and how these athletes can carry out the proposed demands. Additionally, as handball continues to grow within the Brazilian sports landscape, the need for clear and efficient periodization becomes increasingly relevant for achieving competitive results.

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