



Knowledge management and transfer in handball coaches: a mixed study

Gestión y transferencia del conocimiento en entrenadores de balonmano: un estudio mixto

Authors

Reidel Cordovés Peinado^{1,2}
Alfonso de la Rubia Rianza³
Daylanis Gutiérrez Cruzata⁴
Igor Arsene⁵
Raúl Orlando Figueroa Soriano²
Alex Esau Chacón Sevilla²

¹ Universidad Pedagógica Nacional Francisco Morazán (Honduras)

² Universidad Nacional Autónoma de Honduras (Honduras)

³ Universidad Politécnica de Madrid (España)

⁴ Universidad de Oriente (Cuba)

⁵ Universidad Estatal de Moldavia (República de Moldavia)

Corresponding author:
Reidel Cordovés Peinado
Reidel.cordoves@unah.edu.hn

Received: 20-04-26

Accepted: 30-04-26

How to cite in APA

Cordovés Peinado, R., De La Rubia Rianza, A., Gutiérrez Cruzata, D., Arsene, I., Figueroa Soriano, R. O., & Chacón Sevilla, A. E. (2026). Knowledge management and transfer in handball coaches: a mixed study. *Retos*, 80, 670-684. <https://doi.org/10.47197/retos.v80.119292>

Resumen

Objetivo: Analizar la gestión y la transferencia del conocimiento en entrenadores de balonmano, identificando las principales fuentes de conocimiento, cómo se moviliza en la práctica y las estrategias de transferencia utilizadas con los jugadores.

Metodología: Se realizó un estudio mixto, descriptivo y de corte transversal, con 36 entrenadores (31 hombres y 5 mujeres, de 20 a 58 años). Se aplicó un cuestionario para evaluar las fuentes de conocimiento, y 12 entrenadores participaron en entrevistas de autorreflexión con registro de sus sesiones de entrenamiento. Los datos cuantitativos se analizaron mediante las pruebas de Kruskal-Wallis y de Spearman, mientras que los cualitativos se examinaron mediante un análisis temático.

Resultados: La experiencia como entrenador ($M=4.43$) y la autoformación ($M=4.12$) fueron las fuentes de conocimiento más valoradas. Se observaron diferencias significativas según el nivel de experiencia: los entrenadores novatos se apoyaron más en el conocimiento académico y la experiencia previa como jugadores, mientras que los entrenadores experimentados priorizaron la experiencia profesional. Se identificaron cinco tipos de conocimiento movilizados en la práctica (situacional-táctico, pedagógico-didáctico, centrado en el jugador, experiencial y tácito), junto con estrategias de transferencia como la instrucción directa, la retroalimentación, las preguntas reflexivas, el modelado y la creación de rutinas. Los hallazgos destacan el carácter experiencial y contextual del conocimiento del entrenador.

Conclusiones: La gestión del conocimiento en el balonmano integra múltiples fuentes, y la experiencia profesional adquiere mayor relevancia con el paso del tiempo. La autorreflexión se consolida como una herramienta clave para hacer explícito el conocimiento tácito y comprender los procesos de transferencia en contextos reales.

Palabras clave

Gestión del conocimiento; transferencia del conocimiento; entrenamiento deportivo; conocimiento tácito; práctica reflexiva; investigación con métodos mixtos; formación de entrenadores; toma de decisiones

Abstract

Objective: To analyze knowledge management and transfer among handball coaches, identifying the main sources of knowledge, how it is mobilized in practice, and the transfer strategies used with players.

Methodology: A mixed-methods, descriptive, cross-sectional study was conducted with 36 coaches (31 men and 5 women, aged 20 to 58). A questionnaire was administered to assess knowledge sources, and 12 coaches participated in self-reflective interviews with recordings of their training sessions. Quantitative data were analyzed using the Kruskal-Wallis and Spearman tests, while qualitative data were examined through thematic analysis.

Results: Coaching experience ($M=4.43$) and self-directed learning ($M=4.12$) were the most highly valued sources of knowledge. Significant differences were observed according to experience level: novice coaches relied more on academic knowledge and prior experience as players, while experienced coaches prioritized professional experience. Five types of knowledge mobilized in practice were identified (situational-tactical, pedagogical-didactic, player-centered, experiential, and tacit), along with transfer strategies such as direct instruction, feedback, reflective questioning, modeling, and routine creation. The findings highlight the experiential and contextual nature of coach knowledge.

Conclusions: Knowledge management in handball integrates multiple sources, and professional experience becomes increasingly relevant over time. Self-reflection is consolidated as a key tool for making tacit knowledge explicit and understanding transfer processes in real-world contexts.

Keywords

Knowledge management; knowledge transfer; sports training; tacit knowledge; reflective practice; mixed methods research; coach education; decision-making

Introduction

In recent decades, knowledge management (KM) has established itself as a fundamental field of study for understanding the competitive advantage and sustainability of organizations in the so-called knowledge economy (Villasana et al., 2021).

Since its inception, KM has been conceived as a strategic process involving the creation, storage, transfer, and application of knowledge to optimize organizational processes and ensure continuous improvement (Nonaka & Takeuchi, 1995; Davenport & Prusak, 1998).

As Villasana et al. (2021) note in their literature review, KM has evolved from a purely technological approach toward a more holistic perspective that recognizes the central role of people, organizational culture, and social processes in the creation and dissemination of knowledge. This evolution has led to a growing interest in understanding how knowledge—particularly tacit knowledge—is transferred in specific and complex contexts.

In the field of sports, knowledge management and transfer have become increasingly important, both in organizing mega-events and in developing athletic performance (Becerra & Escorcía, 2023; Qin et al., 2022; Zhou, 2023). The dynamic and uncertain nature of high-performance sport requires that the parties involved (managers, coaches, athletes) be able to generate, share, and apply knowledge effectively to optimize training and competition processes. In this regard, knowledge management (KM) emerges as a key tool for capitalizing on experiences, avoiding the repetition of mistakes, and fostering innovation in sports practice (Martínez, 2023). However, despite its importance, research on knowledge management in sport has, until relatively recently, been a fragmented and unevenly developed field, with a notable concentration in the area of event management and less attention paid to learning processes and knowledge transfer in the daily work of teams and coaches (Qin et al., 2022; Lecha & Font, 2024).

Specifically, the study of the coach's knowledge has become a priority line of research for understanding the complexity of pedagogical intervention and the development of professional expertise (Feu Molina et al., 2012; Sandoval et al., 2022). Far from being a mere executor of established formulas, the coach is conceived as a reflective professional who constructs their knowledge by integrating multiple sources: academic training, practical experience (as a player and as a coach), interaction with other colleagues, and continuous self-training (Almonacid et al., 2021; Feu et al., 2012). This knowledge, predominantly practical and tacit, is mobilized in action (Schön, 1983) and transferred to players through complex processes of instruction, communication, and modeling. The effective management of this knowledge, both at the individual and collective levels, is a determining factor in the quality of training and athletic success.

Knowledge transfer, as an essential component of knowledge management, has been identified as a particularly critical yet problematic process in organizational contexts (Zhou, 2023).

Zhou's (2023) systematic review of knowledge transfer in international mega-sporting events identifies significant barriers, including the accessibility and availability of knowledge, the lack of absorption capacity among recipient organizations, and the tension between sharing and protecting knowledge. Although these findings pertain to the field of event organization, they are relevant to the challenges coaches face in their daily practice. How do they manage and transfer their knowledge within a team? What barriers and facilitators do they encounter in this process? How do they use their experience to make split-second decisions during a match? These questions, only partially explored in the literature, point to the need for studies that, using a situated and ecological approach, analyze knowledge management and transfer in the real-world context of coaching practice.

Handball, as a team sport characterized by its high tactical complexity and physical demands, offers an ideal setting for addressing these issues. The role of the handball coach has been the subject of various studies that have analyzed, for example, the influence of their training and experience on their coaching interventions (Feu et al., 2012) or coach training models (Sandoval et al., 2022). However, few studies delve into the internal knowledge management processes that coaches employ in their daily practice, and even fewer examine how this knowledge is transferred to their players in the heat of training and competition. Research in teacher education and sports science has highlighted the value of methodologies such as self-reflection for accessing the implicit dimensions of professional knowledge (Velásquez

et al., 2025; Almonacid et al., 2021), which allows coaches themselves to explain the knowledge they mobilize in action when confronted with a record of their activity. This methodological approach is particularly promising for unraveling the complexity of knowledge management and transfer in handball.

In the broader context of knowledge management in sports and physical activity sciences, works such as those by Muñoz and Cardona (2025) highlight the importance of incorporating these perspectives into the design of training programs, and point to the need to train professionals capable not only of acquiring knowledge but also of managing and transferring it effectively in complex environments. Similarly, Lecha and Font (2024) characterize knowledge management in high-performance athletics, highlighting the diversity of sources and strategies that coaches use to build their knowledge. This finding is likely applicable to other sports, such as handball, which have their own specific characteristics. The review by Becerra and Escorcía (2023) on knowledge transfer and dissemination in sports training concludes that this is an emerging field requiring further empirical research to explore the mechanisms and processes involved in real-world contexts.

For these reasons, the present study aims to analyze knowledge management and transfer among handball coaches. Through a mixed-methods study involving 36 coaches, the study aims to: 1) describe the sources of knowledge that coaches consider most influential in their practice; 2) analyze whether there are differences in the use of these sources based on their professional experience; 3) explore, through self-reflective interviews with a subsample, the processes of knowledge mobilization in practice and the transfer strategies used with players; and 4) identify possible relationships among the different sources of knowledge. The results are expected to contribute to a deeper, more contextualized understanding of how handball coaches construct, manage, and transfer their professional knowledge, with implications for the design of initial and continuing education programs that promote more reflective, evidence-based professional development. Furthermore, the objective is to analyze knowledge management and transfer among handball coaches, identifying key sources of knowledge, how knowledge is mobilized in practice, and the transfer strategies used with players.

Method

This research was conducted using a convergent parallel mixed-methods design, with a descriptive, cross-sectional, and non-experimental scope. In this design, quantitative and qualitative data are collected during the same research period, analyzed independently, and subsequently integrated through triangulation to obtain a more complete understanding of the phenomenon under study (Creswell & Plano Clark, 2017). The quantitative phase enabled the identification and comparison of the main sources of professional knowledge valued by handball coaches. In contrast, the qualitative phase, based on self-reflection interviews supported by audiovisual recordings of training sessions, facilitated a deeper exploration of the processes of knowledge mobilization and transfer in natural practice contexts.

The choice of this design is justified by the multidimensional nature of the coach's professional knowledge, which combines explicit and quantifiable dimensions—such as the evaluation of different sources of knowledge—with tacit, experiential, and situated dimensions that require qualitative inquiry strategies (Almonacid et al., 2021; Velásquez et al., 2025). The integration of both datasets was carried out in the interpretive phase by comparing and articulating the statistical results with the categories emerging from the thematic analysis to identify convergences, complementarities, and explanatory nuances regarding knowledge management and transfer among handball coaches. Ethical approval was obtained in accordance with the Declaration of Helsinki, ensuring informed consent, confidentiality, and anonymity for all participants.

Participants

The study population consisted of active handball coaches. Using non-probabilistic purposive sampling, a final sample of 36 coaches (31 men and 5 women) was selected, aged 20 to 58 years ($M = 36.4$; $SD = 8.7$) and with professional experience ranging from 1 to 22 years ($M = 9.8$; $SD = 5.9$).

The participants competed at different levels: grassroots/youth, regional/provincial, and national. They held various federation certifications (Levels I, II, and III) and academic degrees (bachelor's degrees in



Physical Activity and Sports Sciences and other degrees). Although the sample size is limited for conducting high-powered statistical analyses, it is considered adequate for an exploratory study and is consistent with previous research in sports science (Feu et al., 2012; Sandoval et al., 2022). The limitation associated with sample size was addressed using nonparametric statistical tests; the characteristics are specified in Table 1.

Table 1. Sociodemographic and professional characteristics of the quantitative sample (n = 36)

Variable	Category	n	%
Gender	Male	31	86.1
	Female	5	13.9
Age	20-30 years	12	33.3
	31-40 years	14	38.9
	41-50 years	7	19.4
	Over 50	3	8.3
Coaching experience	1-5 years	10	27.8
	6-10 years	13	36.1
	11-15 years	8	22.2
	Over 15 years	5	13.9
Competitive level	Beginner/Training	14	38.9
	Regional/Provincial	12	33.3
	National	7	19.4
Level of education	International	3	8.3
	No specific degree	4	11.1
	Level I	8	22.2
	Level II	12	33.3
	Level III	7	19.4
	Bachelor's Degree in CAFD	5	13.9

Source: own elaboration

Qualitative subsample

For the qualitative phase, a purposive subsample of 12 coaches was selected from the initial quantitative sample of 36 participants. The selection was based on the criterion of maximum variation to capture the greatest possible diversity of training experiences and contexts, and to delve deeper into the processes of knowledge mobilization and transfer across different professional profiles.

The criteria considered for selection were:

- Years of professional experience (1–5 years, 6–10 years, 11–15 years, and more than 15 years);
- Competitive level at which they coached;
- Availability to participate in the observation and interview phase;
- Geographic and institutional diversity.

Three coaches were selected for each previously defined level of experience, ensuring balanced representation of diverse professional trajectories. Likewise, the subsample included coaches from different national contexts: Cuba (n = 3), Spain (n = 3), Moldova (n = 2), Honduras (n = 1), Mexico (n = 1), Brazil (n = 1), and Colombia (n = 1).

The choice of a smaller subsample for the qualitative phase was guided by methodological criteria specific to studies using self-reflective interviews and observation in natural settings—techniques that entail intensive recording, transcription, and in-depth data analysis (Velásquez et al., 2025). This sample size allowed for sufficient analytical richness without compromising the interpretive depth required to explore the tacit knowledge mobilized by coaches during their practice; this is specified in Table 2.

The interviews were conducted by the researchers, three of whom are former handball players and coaches; all hold PhDs, ensuring the quality and rigor of the instrument application. It should be noted that the interviews were conducted in person and online for those not in the same country as any of the researchers.

Table 2. Selection criteria and characteristics of the qualitative subsample of coaches (n = 12)

Criterion	Category	n	%
Geographic origin	Cuba	3	25.0
	Spain	3	25.0
	Moldova	2	16.7
	Honduras	1	8.3
	México	1	8.3
	Brazil	1	8.3
	Colombia	1	8.3
Professional experience	1–5 years	3	25.0
	6–10 years	3	25.0
	11–15 years	3	25.0
	Over 15 years	3	25.0
Selection criteria	Participants from the initial quantitative sample	12	100
	Willingness to participate in a self-reflection interview and audiovisual recording	12	100
	Diversity of professional experience and practice context	12	100

Source: own elaboration

Procedure

The research was conducted in two complementary phases: quantitative and qualitative.

In the qualitative phase, the self-reflective interview technique was used to access tacit professional knowledge and promote reflection on practice (Velásquez et al., 2025). The procedure was carried out in three stages:

- Video recording of training sessions: A complete training session was recorded for each of the 12 selected coaches with the informed consent of the coaches, players, and clubs, where applicable. The camera focused on capturing the coaches' actions and interactions.
- Pre-analysis of the recordings: The researcher reviewed all videos to identify relevant "units of action," such as technical corrections, tactical instructions, timeouts, and interactions between the coach and players.
- Self-reflection interview: Each coach participated in an individual session in which they viewed their own recording. They were allowed to pause the video and comment on their thoughts, decisions, and emotions. The researcher played a non-directive role, using probing questions to explore the processes of mobilization and knowledge transfer. The interviews lasted approximately 90 minutes and were audio-recorded for transcription.

Instrument

For the quantitative phase, an ad hoc questionnaire was used, based on a literature review and primarily on the instrument validated by Feu et al. (2012) to assess professional knowledge in handball coaching.

The questionnaire was administered online via Google Forms and included three sections:

(a) Sociodemographic and professional data;

(b) A 5-point Likert scale (1 = "Not at all important" to 5 = "Very important") to assess the importance of knowledge sources (academic knowledge, experience as a player, self-directed learning, and experience as a coach);

(c) Additional questions regarding coaching habits and knowledge transfer.

Content validity was established using expert judgment (n = 5), including sports science researchers and experienced coaches, who assessed the clarity, relevance, and appropriateness of the items. Adjustments were made based on their feedback. Reliability analysis using Cronbach's alpha showed acceptable internal consistency ($\alpha > 0.75$) (Field, 2018).

Data Analysis

Quantitative data were exported and analyzed in SPSS, version 28. First, a descriptive analysis was performed (means, standard deviations, and frequencies).

Normality was assessed using the Shapiro-Wilk test due to the small sample size ($n < 50$). The results showed that the variables “experience as a player” ($W = 0.926$; $p = 0.019$) and “experience as a coach” ($W = 0.912$; $p = 0.008$) did not follow a normal distribution. Taking into account methodological recommendations regarding the limited power of normality tests in small samples (Ruxton et al., 2015; Le Boedec, 2016), a conservative approach was adopted, using nonparametric tests throughout.

The Kruskal-Wallis H test was used to compare sources of knowledge across experience groups, with post hoc analyses when necessary. Spearman’s correlation coefficient (ρ) was used to examine relationships among sources of knowledge. The level of statistical significance was set at $p < 0.05$.

The qualitative data from the self-reflection interviews were transcribed in full and analyzed using thematic content analysis. Categories were constructed using a mixed coding strategy: on the one hand, deductive codes derived from the literature on coaches’ professional knowledge, knowledge management, and transfer in sports contexts were used; on the other hand, inductive codes emerging from the coaches’ verbalizations and observations made in the audiovisual recordings of the training sessions were incorporated.

The coding process unfolded in four phases. First, we conducted a complete reading of the transcripts and an initial review of the videos to familiarize ourselves with the empirical material. Second, units of meaning linked to decision-making, knowledge mobilization, coach-player interaction, and transfer strategies were identified. Third, these units were coded in ATLAS.ti, version 9, and grouped into preliminary thematic categories. Fourth, the categories were reviewed, refined, and reorganized through constant comparison between interviews, text quotes, and video observations, until they were consolidated into the final categories presented in the results.

Textual quotations were identified with alphanumeric codes to preserve participant anonymity, indicating the coach’s number and years of experience, for example: E-07, 12 years of experience. Video observations were used as complementary evidence to contextualize the coaches’ statements and verify consistency between what was verbalized in the interview and the actions observed during the training session. In this way, the categories were not constructed solely from discourse but rather through the integration of interviews, audiovisual observation, and interpretive analysis.

To strengthen the rigor of the analysis, two researchers independently coded a portion of the qualitative material and subsequently compared their results. Discrepancies were discussed until consensus was reached. Additionally, triangulation was employed among the self-reflection interviews, video observations, and quantitative results to improve the credibility, consistency, and interpretation of the findings.

Results

Characterization of the sample

A total of 36 handball coaches participated in the study, and their sociodemographic and professional characteristics are presented in Table 1.

Table 3. Sociodemographic and professional characteristics of the coaches (N = 36)

Variable	Category	n	%
Gender	Men	31	86.1%
	Women	5	13.9%
Age	20-30 years	12	33.3%
	31-40 years	14	38.9%
	41-50 years	7	19.4%
	Over 50	3	8.3%
	Coaching experience	1-5 years	10
	6-10 years	13	36.1%
	11-15 years	8	22.2%
	>15 years	5	13.9%
Level of education	No specific degree	4	11.1%
	Level I (beginner)	8	22.2%
	Level II (intermediate)	12	33.3%
	Level III (advanced)	7	19.4%
	CAFDE Degree	5	13.9%



Level of the call	Basic/Training	14	38.9%
	Regional/Provincial	12	33.3%
	National	7	19.4%
	International	3	8.3%

Source: own elaboration

The data show a predominantly male profile (86.1%), consistent with the literature on Spanish handball, where men account for approximately 86.8% of coaches. The majority are in the 31–40 age range and have 6–10 years of experience.

Results of the Shapiro-Wilk normality test

To assess the normality of the distribution of scores from the different sources of knowledge, the Shapiro-Wilk test was applied to each variable analyzed. This test is particularly recommended for small samples ($n < 50$), although with the noted limitations in power.

Table 4. Shapiro-Wilk normality test for sources of knowledge (N = 36)

Variable	Shapiro-Wilk W	df	p-value	Decision ($\alpha=0.05$)
Academic knowledge	0.947	36	0.087	H_0 (normal) is accepted
Playing experience	0.926	36	0.019	H_0 (non-normal) is rejected
Self-learning	0.958	36	0.189	H_0 (normal) is accepted
Coaching experience	0.912	36	0.008	H_0 (non-normal) is rejected

*Note: H_0 = the data follow a normal distribution. H_0 is rejected if $p < 0.05$. *

To test the normality of the distribution of scores across the different sources of knowledge, the Shapiro-Wilk test was applied to each analyzed variable; this test is particularly recommended for small samples ($n < 50$), although it has the power limitations noted in the specialized literature. The results of this test, presented in Table 2, showed differences in behavior among the variables. On the one hand, the variables “academic knowledge” ($W = 0.947$; $p = 0.087$) and “self-training” ($W = 0.958$; $p = 0.189$) had p-values greater than the established significance level ($\alpha = 0.05$), indicating that there is no statistically significant evidence to reject the null hypothesis of normality. Consequently, the scores for both variables are approximately normally distributed in the sample of 36 coaches, with self-training showing the best fit to the normal distribution among all those analyzed; therefore, both variables would theoretically satisfy the normality assumption required for the application of parametric analyses.

On the other hand, the variables “experience as a player” ($W = 0.926$; $p = 0.019$) and “coaching experience” ($W = 0.912$; $p = 0.008$) yielded p-values below 0.05, leading to the rejection of the null hypothesis of normality and the conclusion that their distributions deviate significantly from the normal distribution. In the case of player experience, this deviation is likely due to positive skewness, characterized by a concentration of coaches who rate this source moderately, with a minority assigning extreme scores. As for experience as a coach, which shows the most pronounced deviation from normality (lowest p-value), this result aligns with findings in the specialized literature: coaches with longer professional careers tend to rate this source of knowledge substantially higher, resulting in an asymmetric or ceiling-effect distribution that reflects the primacy of knowledge accumulated through practice over the years. These findings regarding the non-normality of two of the four main variables, interpreted in light of the limitations of the Shapiro-Wilk test in small samples, provided a methodological justification for using nonparametric tests in subsequent inferential analyses.

Quantitative results: sources of the coach's knowledge

A questionnaire adapted from the one designed and validated by Feu Molina et al. (2012) was administered; this assessed the influence of three sources of knowledge on the coach's intervention using a Likert scale (1 = “Not at all important” to 5 = “Very important”). The reliability analysis showed adequate internal consistency (Cronbach's $\alpha > 0.75$ across all three dimensions).

Table 5. Descriptive statistics of knowledge sources (N = 36)

Source of knowledge	Mean (M)	Standard deviation (SD)	Median (Md)	Minimum	Maximum
Academic knowledge (formal education)	3.89	0.67	3.9	2.4	5.0



Playing experience	3.76	0.82	3.8	1.8	5.0
Self-directed learning (clinics, reading, and discussions)	4.12	0.58	4.1	2.9	5.0
Coaching experience	4.43	0.51	4.5	3.2	5.0

Note: scores out of 5.

The descriptive results show that coaching experience is the source of knowledge most highly valued by the participants, as it has the highest mean ($M = 4.43$; $SD = 0.51$) and a high median ($Md = 4.5$), with scores ranging from 3.2 to 5.0. This pattern indicates a consistently high valuation of practical experience as the central pillar in the construction of a handball coach's professional knowledge. The relatively low dispersion of the scores also suggests fairly uniform agreement among participants regarding the decisive role of accumulated practice, decision-making in real-life training and competition situations, and reflection derived from daily experience.

In second place was self-directed learning—workshops, specialized reading, and exchanges with other professionals—with a mean of 4.12 ($SD = 0.58$) and a median of 4.1. This result indicates that coaches do not rely solely on direct experience but also recognize the importance of self-directed learning and continuous professional development as mechanisms for updating, expanding, and reinterpreting their knowledge. The combination of practical experience and self-directed learning suggests that a coach's professional knowledge is constructed through integrating experiences in the intervention context with the active search for new resources, approaches, and educational references.

Academic knowledge occupied an intermediate position ($M = 3.89$; $SD = 0.67$; $Md = 3.9$), indicating that formal education remains valued as a relevant source, though it does not carry the same weight as practical experience or self-directed learning. This finding suggests that academic training provides an important conceptual, methodological, and pedagogical foundation, but that its influence becomes more meaningful when integrated with professional practice and ongoing professional development.

Finally, prior experience as a player had the lowest mean among the sources analyzed ($M = 3.76$; $SD = 0.82$; $Md = 3.8$), although its values remain at a moderate-to-high level of importance. The higher standard deviation observed in this dimension suggests greater heterogeneity among coaches: for some, their playing career serves as a significant reference for interpreting the game and communicating with athletes; for others, its influence may be less significant compared to the knowledge acquired through specific coaching practice.

Comparative Analysis by Level of Experience

To analyze whether there were differences in the use of knowledge sources by years of experience, the Kruskal-Wallis test was applied, given the sample size and the nonparametric nature of the data.

Table 6. Comparison of knowledge sources by coach experience

Source of knowledge	1-5 years (n=10)	6-10 years (n=13)	11-15 years (n=8)	>15 years (n=5)	Kruskal-Wallis H	p
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)		
Academic knowledge	4.21 (0.45)	3.95 (0.58)	3.72 (0.71)	3.48 (0.82)	8.24	0.041*
Playing experience	4.08 (0.63)	3.84 (0.77)	3.55 (0.89)	3.20 (0.95)	9.67	0.022*
Self-directed learning	3.95 (0.52)	4.08 (0.49)	4.25 (0.61)	4.40 (0.55)	6.12	0.106
Coaching experience	3.85 (0.48)	4.31 (0.42)	4.62 (0.39)	4.78 (0.36)	15.83	0.001**

Note: SD = standard deviation; * $p < 0.05$; ** $p < 0.01$.

The analyses reveal significant differences in the evaluation of knowledge sources based on coaches' years of experience. Specifically, it is observed that novice coaches with 1-5 years of experience place greater importance on academic knowledge and their previous experience as players. This phenomenon can be explained by the fact that, in the early stages of their careers, the academic training they received is more recent. Coaches have not yet had enough experience to make it their primary point of reference, so they turn to the sources of knowledge that are most accessible and familiar to them.

As professional experience increases, this trend gradually shifts. The results indicate that, as coaches accumulate years of practice, the value placed on both academic knowledge and experience as players decreases, while the importance attributed to their own experience as coaches increases significantly, reaching a level of notable statistical significance ($H = 15.83$; $p = 0.001$). This finding suggests that

knowledge acquired through direct practice, reflection on action, and the resolution of real-world problems in natural training and competition contexts comes to play a central role over time in shaping the coach's professional knowledge.

Particular note should be made of the performance of self-directed learning, which consistently achieves high scores across all experience groups analyzed, with no statistically significant differences observed between them. This consistency suggests that self-directed learning is a cross-cutting source of knowledge, valued regardless of the coach's level of experience, highlighting the importance professionals place on continuous professional development, the search for new ideas, and the exchange of knowledge with their colleagues throughout their careers.

Overall, these results are consistent with previous research, which indicates that coaches with greater training and experience tend to rely less on the knowledge acquired during their playing careers and, conversely, base their practice increasingly on the knowledge accumulated throughout their professional lives, resulting from continuous practice, reflection, and the consolidation of both successful and unsuccessful experiences.

Correlations Among Sources of Knowledge

Spearman's correlation coefficient (ρ) was applied to explore the relationships between the different sources of knowledge.

Table 7. Correlation matrix between sources of knowledge (Spearman's rho)

	Academic knowledge	Experience as a player	Self-training	Experience as a coach
Academic knowledge	1,000			
Experience as a player	0.312	1,000		
Self-directed learning	0.423*	0.198	1,000	
Coaching experience	-0.387*	-0.452**	0.341	1,000

Note. Spearman's rho correlation coefficient (ρ) is reported, as it is used due to the ordinal nature of the scales and the lack of normality in some variables. Positive values indicate a direct relationship between the sources of knowledge, while negative values indicate an inverse relationship. * $p < 0.05$; ** $p < 0.01$.

The analysis of correlations among sources of knowledge, using Spearman's correlation coefficient (ρ), revealed significant associations warranting further attention. First, a moderate positive correlation was observed between academic knowledge and self-directed learning ($\rho = 0.423$; $p < 0.05$), suggesting that coaches with higher formal qualifications also tend to actively seek complementary training through seminars, specialized readings, and exchanges with other professionals. This synergy between the two sources of training suggests that formal education could act as a catalyst, increasing the coach's awareness of the need to stay up to date and to delve deeper into specific aspects of their practice, thereby generating a virtuous cycle of continuous learning.

On the other hand, statistically significant negative correlations were identified between coaching experience and other sources of knowledge. Specifically, a moderate negative correlation was found between coaching experience and academic knowledge ($\rho = -0.387$; $p < 0.05$), and a more pronounced negative correlation with playing experience ($\rho = -0.452$; $p < 0.01$). These results reinforce the idea, widely documented in the specialized literature, that as coaches accumulate years of professional practice, knowledge acquired through direct experience tends to assume a predominant role, relativizing and even progressively displacing the influence of other sources of knowledge that were more relevant in the early stages of their careers. This progressive "experientialization" of professional knowledge reflects a developmental process in which reflection on practice and the consolidation of situated learning ultimately shape a personal, contextualized body of knowledge that serves as the primary guide for intervention, taking precedence over knowledge acquired during academic training or from athletic experience.

Self-reflection Analysis

Self-reflection interviews were conducted with 12 coaches, intentionally selected from the total sample (3 per level of experience). Content analysis of the interviews, using a systematic coding process, allowed for the identification of emerging categories related to the management and transfer of knowledge in practice.



Table 8. Categories of knowledge emerging from the self-reflection analysis

Category	Description	Frequency of mention	Illustrative example
Situational tactical knowledge	Ability to read the game and make decisions in context	42 mentions (12 out of 12 coaches)	"That's where I freeze the image... when the center back receives the ball, I see that the opposing fullback is wide open, and I know that if we make an indirect block, we'll create a numerical advantage. I've seen it a thousand times, and now it's second nature to me." (E-07, 12 years of experience)
Pedagogical and didactic knowledge	Knowledge of how to teach, correct, and communicate	38 mentions (11 out of 12 coaches)	"At that moment, I shout: 'Close the space! Close the space!' But it's not just the words; it's the tone. I know that with this particular player, if I don't shout at him like that, he doesn't react. It's something I've learned with him, by getting to know him." (E-03, 8 years of experience)
Knowledge of the player	Knowledge of athletes' individual characteristics, motivations, and emotional states	35 mentions (10 out of 12 coaches)	"I didn't substitute him at that moment because I saw his face. He was frustrated at having missed, but I knew that if I took him out now, he'd feel devastated. I'd rather let him recover on his own." (E-11, 15 years of experience)
Comparative empirical knowledge	Knowledge based on comparison with previously experienced situations	29 mentions (9 out of 12 coaches)	"This reminds me of a game from last season against a similar team. In that game, we did the opposite and they tied us. That's why I'm reacting this way now—so we don't repeat the mistake." (E-09, 10 years of experience)
Tacit/automatic knowledge	Knowledge that is activated without conscious reflection, "the sixth sense."	21 mentions (8 out of 12 coaches)	"I'm not really sure why I did it... it was automatic. It's as if my body demanded that reaction. I suppose it's due to experience; now it's second nature." (E-12, 22 years of experience)

Source: own elaboration

Identified knowledge transfer processes

The analysis of verbalizations during self-assessment also allowed us to identify how coaches transfer their knowledge to players.

Table 9. Knowledge transfer strategies observed in the sessions

Strategy	Description	Illustrative example
Direct instruction	One-way transmission of information (what to do)	"I'll say it clearly: 'You have to go to the first post and you to the second.' There's no discussion; that's what needs to be done."
Corrective feedback	Transfer through error correction.	"When I see him doing the movement wrong, I stop him and say, 'Look, do it like this.' That's my way of passing on what I know."
Reflective questions	The goal of transfer is to activate the player's knowledge	"Instead of telling him what to do, I ask him: 'What did you see there? What options did you have?' So he thinks for himself."
Modeling	Transfer through practical demonstration.	"Sometimes I have to do it myself, show them how I want them to position themselves. Handball is very visual."
Creating routines	Transfer incorporated into the training structure	"We always work on this way. Now they have internalized it so much that I don't need to say a word. The knowledge is already implicit in the exercise."

Source: own elaboration

Integrating quantitative and qualitative results through triangulation strategies yields a more comprehensive and nuanced understanding of the phenomenon under study, revealing points of convergence and complementarity that enrich the overall interpretation. First, there is a clear complementarity between the two methodological approaches regarding sources of knowledge. While quantitative data indicate that coaching experience is the source most highly valued by the sample as a whole ($M = 4.43$), the qualitative analysis, based on self-reflection interviews, allows us to specify how that experience translates into knowledge mobilized in action. Thus, categories such as situational tactical knowledge and knowledge of the player frequently emerge as the practical, contextualized manifestation of experience accumulated over the years. This complementarity demonstrates that the abstract assessment of a

source of knowledge acquires its true meaning when one observes how it materializes in concrete intervention strategies and in the coach's ability to read and respond to the changing demands of the game and of their athletes.

Second, the evolution of knowledge throughout a professional career, as quantitatively evidenced by the significant differences observed between the experience groups (Table 3), is clearly reflected in the coaches' own accounts during their self-reflections. More experienced coaches more frequently and richly articulate categories such as comparative experiential knowledge, drawing analogies with past situations to justify their current decisions, as well as a more tacit and automated form of knowledge that emerges in their explanations as a type of knowledge they "already possess" and activate without the need for conscious reflection. In contrast, novice coaches tend to refer more frequently in their verbalizations to aspects directly linked to their recent academic training or their experiences as players, drawing on these sources to justify their interventions. This convergence between numerical data and qualitative narratives reinforces the validity of the findings. It provides a dynamic picture of the coach's professional development, in which knowledge is transformed and reconfigured over time and through the accumulation of experience.

Integration of Quantitative and Qualitative Results

The integration of quantitative and qualitative findings, carried out through a convergent triangulation strategy, allowed us to identify patterns of complementarity between both phases of the study and to offer a deeper understanding of knowledge management and transfer among handball coaches.

First, the quantitative results showed that coaching experience is the most valued source of knowledge among participants, followed by self-directed learning. This trend was confirmed by the qualitative evidence, in which coaches described decision-making processes grounded in accumulated experience, the recognition of tactical patterns, and automated responses to complex training and competition situations. Categories such as situational tactical knowledge, comparative experiential knowledge, and tacit knowledge demonstrate how professional experience is transformed into highly contextualized practical knowledge.

Second, the differences found based on years of experience were also supported by the qualitative phase. While novice coaches placed greater emphasis on academic knowledge and their prior experience as players, more experienced coaches focused their discourse on professional intuition, reflection on past experiences, and automated decision-making. This suggests a progressive evolution of professional knowledge from more explicit, formal forms to more tacit, situated forms.

Likewise, the quantitative stability observed in self-training as a source of knowledge was complemented by the interviews, in which coaches repeatedly highlighted their ongoing pursuit of professional development through reading, sports clinics, and exchanges with other professionals. This finding demonstrates that continuous learning is a cross-cutting practice regardless of experience level.

Finally, the qualitative phase enabled a deeper exploration of a dimension the questionnaire could not fully capture: the specific mechanisms of knowledge transfer to players. Strategies such as direct instruction, corrective feedback, reflective questions, modeling, and the creation of routines showed that knowledge transfer occurs through highly dynamic and adaptive pedagogical processes.

Taken together, convergent triangulation demonstrated that the coach's professional knowledge does not depend on a single source, but rather on the interaction between experience, continuing education, formal knowledge, and reflection processes embedded in daily practice. The integration of both approaches allowed us to overcome the limitations of each and strengthen the interpretive validity of the findings.

Table 10. Integration of quantitative and qualitative results on knowledge management and transfer

Quantitative finding	Qualitative evidence	Meta-inference / integrated interpretation
Coaching experience was the most highly valued source of knowledge (M = 4.43; Md = 4.5).	Coaches described automatic decisions based on prior experiences and situational knowledge of the game.	Professional experience is the primary foundation of practical knowledge and fosters adaptive responses in real-world contexts.
Self-training showed high and stable values across all levels of experience (M = 4.12).	Coaches mentioned the frequent use of reading, clinics, and exchanges with colleagues.	Continuing education is presented as a cross-cutting strategy for professional development.

Novice coaches placed greater value on academic knowledge and experience as players.	Coaches with less experience justified their decisions by more frequently drawing on content learned during their initial training.	In the early stages, formal knowledge serves as a foundation before practical experience is consolidated.
Experienced coaches placed greater value on professional experience (H = 15.83; p = 0.001).	Categories such as tacit knowledge and comparative experiential knowledge emerged.	Extended experience promotes the automation and sophistication of professional knowledge.
The questionnaire did not allow for the identification of specific transfer mechanisms.	Strategies such as direct instruction, corrective feedback, modeling, and reflective questions were identified.	The qualitative phase complemented the questionnaire's limitations by revealing how knowledge transfer actually occurs.

Source: own elaboration

Discussion

The findings of this study provide evidence on how handball coaches construct, mobilize, and transfer knowledge in real-world coaching contexts. Based on the integration of quantitative and qualitative results, the data suggest that the coach's professional knowledge is shaped by the interplay among practical experience, continuing education, academic knowledge, and prior player experience, although these sources do not appear to carry equal weight throughout the professional career.

First, coaching experience stood out as the most valued source of knowledge among the participants, followed by self-directed learning. This finding aligns with previous research highlighting the experiential and situated nature of professional knowledge in sports (Feu et al., 2012; Sandoval et al., 2022; Almonacid et al., 2021). However, rather than assuming that experience completely replaces other forms of learning, the results suggest that it becomes more relevant as coaches face real-world training situations, problem-solving, and decision-making in changing scenarios.

The differences across years of experience indicate that novice coaches tend to rely more on academic knowledge and their prior player experience, whereas more experienced coaches place greater emphasis on accumulated professional experience. Although these findings suggest a possible evolution of professional knowledge throughout one's career, the cross-sectional design of the study does not allow for a conclusive confirmation of this trajectory; therefore, future longitudinal research could delve deeper into this transformation.

Self-directed learning remained at high and relatively stable levels across all experience groups, suggesting that continuous learning is a cross-cutting practice in a coach's professional development. This finding is particularly relevant to recent research on professional competencies in sports coaching. In this vein, Quinaud, et al. (2026) developed a questionnaire to measure functional competencies in sports coaches and highlight the need to continue investigating how coaches develop, update, and apply competencies in real-world scenarios. Our findings complement this line of research by showing how such competencies are also constructed through continuous processes of self-training and practical reflection.

The qualitative results allowed us to delve deeper into dimensions that the questionnaire could not fully capture. The emerging categories—situational tactical knowledge, pedagogical-didactic knowledge, player-related knowledge, comparative experiential knowledge, and tacit knowledge—demonstrate that the coach's knowledge extends beyond technical aspects to include interpersonal, emotional, and contextual components. In particular, knowledge of the players emerged as a relevant component in adapting decisions and interventions, suggesting that the coach's effectiveness also depends on their ability to interpret human variables, as well as tactical ones.

Regarding knowledge transfer, the results show that coaches employ multiple pedagogical strategies to convey knowledge to players, including direct instruction, corrective feedback, modeling, reflective questioning, and routine creation. Rather than representing opposing models of teaching, these strategies appear to coexist flexibly depending on the demands of each context, the player's profile, and training objectives. This finding reinforces the idea that knowledge transfer in sport is a dynamic and highly contextualized process.

From a broader perspective of knowledge management in sport, this study provides empirical evidence to a field that remains emerging, particularly in everyday training contexts (Qin et al., 2022; Zhou, 2023).



While much of the literature has focused on sports organizations or large-scale events, our results suggest that knowledge creation and transfer also occur intensely at the micro level of everyday interactions between coaches and athletes.

Furthermore, the combined use of questionnaires, video observation, and self-reflection interviews allowed access to both explicit and tacit dimensions of professional knowledge. Rather than claiming that this methodology fully resolves the limitations of studying tacit knowledge, the results show that it constitutes a useful alternative for exploring processes that are difficult to observe with traditional instruments.

Study Limitations

Despite the study's contributions, several methodological and contextual limitations must be considered when interpreting the findings.

First, the size of the quantitative sample ($n = 36$) limits the generalizability of the results. It reduces the ability to conduct more complex statistical analyses or to establish patterns that can be extrapolated to broader populations of handball coaches. Although the sample size is consistent with previous exploratory research in sports science, and non-parametric tests were used to reduce potential biases arising from data distribution, the results should be interpreted with caution.

Second, the cross-sectional design prevents an understanding of how sources of knowledge and transfer processes evolve over time. While the results suggest possible differences between novice and experienced coaches, they do not allow for establishing causal trajectories or confirming evolutionary processes in the coach's professional development. Longitudinal studies could provide greater clarity on how professional knowledge transforms across different career stages.

Third, although the international diversity of the qualitative subsample enriched the study by including coaches from different countries, it also introduced significant contextual heterogeneity. Participants came from different sports systems, training structures, and cultural contexts—factors that can influence coaching practices, knowledge construction, and the styles of knowledge transfer employed. These contextual differences were not analyzed comparatively in this study and represent a relevant avenue for future research.

Fourth, the combination of in-person and virtual interviews in the qualitative phase may have led to variations in the depth of interaction between researcher and participant. Although a standardized methodological protocol was applied to minimize these differences, virtual interviews may limit the observation of certain nonverbal elements and partially affect the reflective dynamic.

Fifth, the video-assisted self-reflection technique, while allowing access to tacit dimensions of professional knowledge that are difficult to identify through traditional questionnaires, depends on each coach's capacity for verbalization, memory, and reflective disposition. Some participants may have rationalized decisions made intuitively or automatically, which represents an inherent limitation of this type of retrospective methodology.

Sixth, the questionnaire used was adapted from previous research, and although it demonstrated acceptable evidence of content validity and internal consistency, future research could explore additional psychometric validation processes using larger samples and a variety of sports contexts. In this regard, recent studies, such as that by Quinaud et al. (2026), highlight the ongoing need to strengthen instruments for assessing the competencies and processes associated with sports coaches' performance.

Seventh, although the mixed-methods design enabled the integration of quantitative and qualitative data, the exploratory nature of the study precludes the establishment of definitive explanatory models regarding the relationship between sources of knowledge and transfer strategies. Future research could incorporate explanatory sequential designs, multivariate analyses, or longitudinal approaches to further explore these relationships.

Finally, the study focused exclusively on the coaches' perspective. The views of players, assistant coaches, or sports administrators were not incorporated, which could have provided a broader understanding of the actual effectiveness of the knowledge transfer strategies implemented during training.

Practical Implications



The findings suggest that coach education programs could benefit from approaches that integrate academic training, experiential learning, and systematic strategies for reflection on practice. Likewise, methodologies such as video analysis, self-reflection, and peer exchange could strengthen the development of competencies related to knowledge management and transfer in sports contexts.

Overall, this study offers exploratory evidence on how handball coaches manage and transfer knowledge in real-world settings and opens new avenues for investigating these processes using broader, longitudinal methodological approaches.

Conclusions

The study shows that coaching experience and self-directed learning are the knowledge sources most valued by handball coaches, while academic knowledge and prior player experience play a complementary role.

Furthermore, differences were identified by years of experience: coaches with less experience place greater value on academic knowledge and their experience as players. In contrast, more experienced coaches attach greater importance to experience gained in practice. However, due to the study's cross-sectional design, these results should be interpreted as associations rather than a causal relationship.

The qualitative analysis identified five forms of knowledge mobilized in practice: tactical-situational, pedagogical-didactic, player-centered, comparative experiential, and tacit. Transfer strategies such as direct instruction, corrective feedback, reflective questions, modeling, and routine creation were also observed.

Taken together, the findings suggest that knowledge management and transfer among handball coaches are contextual, practical processes supported by the interaction among experience, continuing education, and reflection on practice.

Financing

This research is funded by the National Autonomous University of Honduras to cover the APC fees.

References

- Almonacid-Fierro, A., Vargas Vitoria, R., Mondaca Urrutia, J., & Sepúlveda-Vallejos, S. (2021). Professional practices during the COVID-19 pandemic: Challenges for initial training in physical education. *Retos*, 42, 162–171. <https://doi.org/10.47197/retos.v42i0.87353>
- Becerra Patiño, B. A., & Escorcía-Clavijo, J. B. (2023). Knowledge transfer and dissemination in sports training: An exploratory review. *Retos*, 50, 79–90. <https://doi.org/10.47197/retos.v50.99163>
- Creswell, J. W., & Plano Clark, V. L. (2017). *Designing and conducting mixed methods research* (3rd ed.). Sage.
- Davenport, T. H., & Prusak, L. (1998). *Working knowledge: How organizations manage what they know*. Harvard Business School Press.
- Feu Molina, S., Ibáñez Godoy, S. J., Lorenzo Calvo, A., Jiménez Saiz, S., & Cañadas Alonso, M. (2012). Professional knowledge acquired by handball coaches: Experiences and training. *Journal of Sport Psychology*, 21(1), 107–115. <https://www.redalyc.org/pdf/2351/235124455014.pdf>
- Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). Sage.
- Flick, U. (2018). *An introduction to qualitative research* (6th ed.). Sage.
- Le Boedec, K. (2016). Sensitivity and specificity of normality tests and consequences on reference interval accuracy at small sample size: A computer-simulation study. *Veterinary Clinical Pathology*, 45(4), 648–656. <https://doi.org/10.1111/vcp.12390>
- Lecha Martín, D. A., & Font Rodríguez, I. (2024). Characterization of knowledge management in high-performance athletics. *Olimpia Scientific Journal*, 22(1), 151–167. <https://revistas.udg.co.cu/index.php/olimpia/article/view/4842>



- Martínez-Salinas, F. J. (2023). Knowledge management in sports practice. *Revista Docentes 2.0*, 16(2), 24–29. <https://doi.org/10.37843/rtd.v16i2.370>
- Muñoz-Bedoya, J.-F., & Cardona, L. (2025). Knowledge management in the administration of physical education and sports science training programs. *Praxis & Saber*, 16(46), 1–19. <https://doi.org/10.19053/uptc.22160159.v16.n46.2025.18104>
- Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. Oxford University Press.
- Qin, Y., Rocha, C. M., & Morrow, S. (2022). Knowledge management in sport mega-events: A systematic literature review. *Frontiers in Sports and Active Living*, 4, Article 1056390. <https://doi.org/10.3389/fspor.2022.1056390>
- Quinaud, R. T., Cruz Martins, L., & Milistetd, M. (2026). The Competency Questionnaire for Coaches: Measuring the Functional Competencies of Sports Coaches. *Retos*, 77, 42–55. <https://doi.org/10.47197/retos.v77.118005>
- Ruxton, G. D., Wilkinson, D. M., & Neuhäuser, M. (2015). Advice on testing the null hypothesis that a sample is drawn from a normal distribution. *Animal Behaviour*, 107, 249–252. <https://doi.org/10.1016/j.anbehav.2015.07.006>
- Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. Basic Books.
- Velasquez-Semper, F., Toloza Vásquez, T., Romero Pérez, J., & Núñez-Moscoso, J. (2025). The self-confrontation interview as a means of accessing teacher education: Theoretical, methodological, and practical aspects. *Journal of Studies and Experiences in Education*, 24(54), 294–313. <https://doi.org/10.21703/rexe.v24i54.2715>
- Villasana, L., Hernández, P., & Ramírez, É. (2021). Knowledge management: Past, present, and future. A literature review. *Trascender, Accounting and Management*, 6(18), 53–78. <https://doi.org/10.36791/tcg.v0i18.128>
- Zhou, J. (2023). A systematic review of knowledge transfer in international sport mega-events. *Sustainability*, 15(6), Article 4902. <https://doi.org/10.3390/su15064902>

Authors and translators' details:

Reidel Cordovés Peinado	reidel.cordoves@unah.edu.hn	Author
Alfonso De La Rubia Riaza	alfonso.delarubia@upm.es	Author
Daylanis Gutiérrez Cruzata	dgutierrez@uo.edu.cu	Author
Igor Arsene	rogienesra@gmail.com	Author
Raúl Orlando Figueroa Soriano	raul.figueroa@unah.edu.hn	Author
Alex Esau Chacón Sevilla	esaualex88@yahoo.com	Author
Suany Melissa Baca López	suany.lopez@unah.edu.hn	Translator