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Communication Patterns Direct Demonstration and Verbal Instructions in the SMCR Program to Improve Coach-Athlete Relationships through Interpersonal Communication

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Abstract This study aims to analyze the effect of two communication methods, verbal and demonstration, in the SMCR communication program on improving high jump ability and team communication effectiveness (SECTS). The research used a quantitative approach with a pretest–posttest experimental design using a paired sample t-test. The sample consisted of 10 athletes with varying Functional Movement Screen (FMS) scores divided into two categories: high FMS (≥18) and moderate (<18). The analysis results showed that both methods resulted in significant improvements in physical performance (high jump) and interpersonal communication (SECTS), with a significance value (p) <0.001 for both variables. However, the demonstration method provided higher improvements in athletes with high FMS, while the verbal method was more effective for the moderate FMS group. These findings indicate that the effectiveness of communication methods is highly dependent on the athlete's functional movement capacity. The discussion of the results shows that coach communication serves not only as technical instruction but also as a means of fostering cohesion and communication efficiency within the team. This implies that coaches need to consider the level of motor readiness and individual characteristics when selecting a communication approach. Integrating a pedagogical approach into a sports communication strategy can be key to optimizing the coach-athlete relationship and achieving maximum performance in training and competition.

Keywords Interpersonal Communication, Demonstration Method, Verbal Instructions, High Jump, SECTS

1. Introduction

Effective communication is the cornerstone of successful coach-athlete relationships, influencing athlete satisfaction and performance [1]. The SMCR model provides a framework for analyzing the dynamics of this communication process, focusing on how messages are conveyed and received [2]. Within this model, the channel through which communication occurs plays a pivotal role, particularly when considering direct demonstration and verbal instructions as distinct methods of conveying information. Direct demonstration involves the coach physically showing the athlete how to perform a skill or execute a strategy, offering a visual and kinesthetic learning experience, while verbal instructions rely on the spoken word to convey information, requiring the athlete to translate the language into a mental representation of the desired action [3], [4]. Analyzing these channels through the SMCR model can offer insights into optimizing communication strategies to foster stronger coach-athlete relationships. Indeed, the discourse used by coaches significantly impacts the relationship they have with athletes, influencing dynamics within the team and among individual athletes; it is therefore crucial to examine the interaction between coaches and athletes during training and competition [5]. As coaches spend considerable time with student-athletes, they must be effective communicators, motivators, teachers, and ethical models, distinguishing their role from that of faculty members [6].

In the context of coach-athlete communication, the SMCR model can be dissected into its components to understand how each channel influences the overall communication process [1], [7]. The sender, in this case, the coach, must encode their message in a way that is easily understood by the athlete, with the encoding process differing significantly between direct demonstration and verbal instructions. In direct demonstration, the coach encodes the message through physical movements, body language, and visual cues, while verbal instructions require the coach to encode it through carefully chosen words, tone of voice, and clarity of explanation. The channel, which is the medium through which the message travels, is either visual and kinesthetic (direct demonstration) or auditory (verbal instructions) [8], [9]. When receiving the message, the athlete must decode it based on their prior knowledge, experience, and understanding of the sport [5]. In verbal communication, clear and constructive interactions among players, coaches, administrators, parents, and other team members are essential, mirroring effective communication in any organization. It has been noted that strategic team tactics used in team sports, such as soccer and basketball, are not the focus of the model; rather, the emphasis is on skill acquisition and refinement in practice designs [10]. Differences between coaches and athletes regarding race, ethnicity, and cultural background may also affect their interpersonal relationships, as racial and cultural diversity in sports has been increasing.

The effectiveness of each channel is further influenced by potential noise, which refers to any interference that can distort or impede the message. Noise can take many forms, including environmental distractions, emotional states, or cognitive limitations [11], [12]. When using direct demonstration, noise may include poor visibility, inadequate equipment, or the athlete's inability to physically replicate the demonstrated skill. With verbal instructions, noise may include background noise, the athlete's limited attention span, or the coach's use of complex or ambiguous language. Feedback, the final component of the SMCR model, is crucial for ensuring that the message was accurately received and understood [13]. Coaches need to be aware of and address the potential for miscommunication by seeking feedback from athletes and adjusting their communication style accordingly, considering the environment, context, and potential interference. In order to foster the ideal coach-athlete dynamic, communication should be rooted in respect, understanding, acceptance, tolerance, and cooperation [14], [15]. Furthermore, athletes need to understand the coach's communication style and adjust accordingly to glean the intended message.

The coach-athlete relationship is very important because an athlete that is satisfied performs better [16]. Accordingly, one investigation of communication strategies suggests that motivation, support, and conflict management are key [1]. Indeed, communication is the fuel for quality coach-athlete relationships and athlete satisfaction [1]. Coaches can engage in formal or informal conversations using techniques such as asking powerful questions, and active, empathic, and compassionate listening. While athletes form many significant relationships over the course of their sporting career, the relationship they form with their coach is key to their sporting development and performance success [1]. The motivational styles and approaches of coaches have been extensively examined through theories of self-determination and achievement goals [17].

Coaches who show effective behavior can have a positive effect on athletes' performance, behavior, and psychological and emotional well-being [18]. Communication is an important aspect of a successful coach-athlete relationship. The degree to which leaders and followers share a common understanding is critical to effective leadership, highlighting the importance of communication in achieving shared goals and fostering a strong sense of purpose [19].

The SMCR model underscores the importance of the channel in determining the effectiveness of communication. When applied to coaching, the choice between direct demonstration and verbal instruction as a channel can significantly impact an athlete's understanding and

performance [1], [2], [20]. Direct demonstration provides a visual and kinesthetic pathway for learning, allowing athletes to observe and internalize the desired movement patterns, and this can be particularly effective for athletes who are visual or kinesthetic learners, as they can directly see and feel the correct technique [21], [22]. Conversely, verbal instructions rely on the athlete's ability to process and translate language into a mental image and motor plan. This approach may be more suitable for athletes who are auditory learners or those who possess a strong understanding of the sport's terminology and concepts. However, verbal instructions can be less effective, if the athlete lacks the necessary background knowledge or if the language used is ambiguous or overly complex. Effective communication hinges on the coach's ability to tailor their communication style to the athlete's individual learning preferences and understanding.

Autonomy-supportive coaches foster an environment where athletes feel understood and appreciated for their unique skills and perspectives [23], [24]. When communication is clear, athletes are better equipped to understand their coach's expectations and integrate feedback effectively. Coaches should cultivate strategies to create opportunities to develop strong bonds, because the relationship they form with their coach is key to their sporting development and performance success [1], [25]. Furthermore, establishing and maintaining clear coach-player relations is essential for quality work in sports for both coaches and players [26].

When coaches communicate effectively, it can foster a stronger sense of team cohesion, motivation, and overall satisfaction, leading to improved performance and a more positive sporting experience. Communication skills can be used to effectively change a student's behavior and level of academic achievement [27]. Ultimately, a positive coach-athlete relationship can influence commitment, motivation, athletes' satisfaction, athletes' performance, intrinsic motivation, and athletes' well-being.

Effective communication is essential for successful coaching, especially since the connection between coach and athlete has a high impact on coaching outcomes [28]. The coach-athlete relationship depends on effective communication strategies from the coach, yet many coaches do not know how to communicate effectively with their athletes. Communication is key to forming a relationship between coach and athlete and helping athletes reach their full potential. Without communication, the coach-athlete relationship will likely be ineffective, leading to frustration, decreased performance, and a negative sporting experience.

1.1. Hypothesis

- *Hypothesis 1*

  H_0: There is no significant difference between the high jump pre-test and post-test results after the verbal or demonstration method.

  H_a: There is a significant difference between the high jump pre-test and post-test results after the verbal or demonstration method.

- *Hypothesis 2*

  H_0: There is no significant difference between the SECTS pre-test and post-test results after the verbal or demonstration method.

  H_a: There is a significant difference between the SECTS pre-test and post-test results after the verbal or demonstration method.

2. Materials and Methods

2.1. Design

This study used a within-subjects or repeated measures design, in which each athlete received both treatments: verbal communication and demonstration. This design was chosen because it allows for direct comparison of treatments within the same individual, thereby reducing the influence of variability between participants and increasing the validity of the results. Ten high jump athletes participated. They were randomly divided into two groups based on the order of treatment (counterbalancing) to anticipate order effects. Five athletes received the verbal treatment first, followed by the demonstration, while the other five received the demonstration first, then the verbal. This strategy was crucial to avoid learning effects or fatigue that could influence the results.

Each treatment began with a pre-test (3 high jump push-offs) to obtain baseline data, followed by a training session using a specific method, and concluded with a post-test (3 push-offs) to measure post-intervention results. A 3–5-day washout period of light, non-technical activity was applied between the two treatments to prevent any residual effects from the first treatment on the second. This design is effective for comparing the impact of two coach communication approaches on improving high jump technical skills, and is relevant for contexts with limited sample sizes but requiring accurate data.

2.2. Research Sample

The sample in this study consisted of 10 first-year sports students with a particular interest in athletics, particularly the high jump. The sample was selected purposively based on the following criteria: physical health, no injury in the past three months, and willingness to participate in all stages of the study. Participants included 6 males and 4 females, ranging in age from 18.6 to 20.3 years.

To add dimension to the analysis of the results, researchers also measured each participant's functional movement abilities using the Functional Movement Screen (FMS). The FMS consists of 7 movement components

(such as the deep squat, hurdle step, inline lunge, shoulder mobility, active straight leg raises, trunk stability push-up, and rotary stability), each scored on a scale of 1–3, resulting in a maximum total score of 21.

Participants' FMS scores in this study ranged from 10 to 21, reflecting variations in fundamental movement abilities that may contribute to the effectiveness of high jump technique training. With this FMS data, researchers were able to evaluate whether differences in functional movement abilities influenced participants' responses to verbal communication and demonstration training methods. The following are details of the research sample. Details of the research sample can be seen in Table 1 below.

Table 1. Research Sample

No	Initials	Gender	Age (in years)	FMS Score
1	EPR	Male	19,4	20
2	NEP	Male	18,11	19
3	ER	Male	20,3	12
4	NP	Female	19	20
5	AD	Male	19,5	12
6	IO	Female	20,2	11
7	SN	Female	20	18
8	ND	Female	19,9	20
9	NDP	Male	19,1	10
10	RKH	Male	18,6	21

Note:
7 Functional Movement Screen (FMS) Components: 1) deep squat, 2) hurdle step, 3) inline lunge, 4) shoulder mobility test, 5) active straight leg raise (ASLR), 6) trunk stability push-up, 7) rotary stability test [29].

2.3. Instrument

This study used two primary measures to capture the effects of coaching methods—high jump ability and team communication quality, as indicators of physical performance and interpersonal interaction. These performance measures not only assess athletes' technical aspects but also relate to the coach's delivery of instructions, which can impact the overall team dynamic.

High Jump Ability: This measure was used to assess the effectiveness of high jump technique in athletes, before and after each communication method (verbal vs. demonstration). Each athlete performed three ultimate push-offs during each intervention phase. The outcome was the average jump height (in cm), which reflects improvements in physical ability and technique. This measure aims to directly and objectively compare the impact of coaching methods on athlete performance.

Scale for Effective Communication in Team Sports (SECTS): The Scale for Effective Communication in Team Sports (SECTS) is a seven-level Likert-level questionnaire developed [30]. This tool is designed to measure the effectiveness of intrateam communication, based on social exchange theory, which views communication as an exchange of emotional, social, and informational resources. The SECTS consists of four main dimensions: (1) Acceptance (7 items): assesses trust, emotional honesty, respect, and inclusion within the team. (2) Distinctiveness (3 items): measures group uniqueness, such as the use of nicknames, slang, or distinctive team gestures. (3) Negative Conflict (3 items): measures destructive conflict, such as yelling, aggressive body language, or direct confrontation when disagreeing. (4) Positive Conflict (3 items): assesses constructive conflict, namely the ability to express dissatisfaction clearly and openly and resolve it directly. The validity of the SECTS has been tested through exploratory and confirmatory factor analyses, resulting in a stable four-factor structure, with positive correlations between Acceptance, Distinctiveness, and Positive Conflict and team cohesion, and negative correlations between Negative Conflict and task cohesion. The internal reliability of each dimension was reported to be strong, with Cronbach's alpha values ranging from 0.73 to 0.86. In this study, the SECTS was used to measure athletes' perceptions of effective communication after each method (verbal and demonstration), allowing for quantitative analysis of changes in team communication based on the treatment.

2.4. Procedure

This study was conducted in stages using a within-subjects design, where each athlete received two treatments: verbal communication and demonstration. Each treatment phase began with a pre-test, followed by a training session using treatment 1, and then a post-test to measure results. To avoid residual effects from the first treatment, a 3–5-day washout period was implemented, with light activity and no high jump training. Details of the implementation time and stages are shown in Table 2.

2.5. Data Analysis

The data obtained from the pre- and post-tests of each treatment (verbal communication and demonstration) were then analyzed quantitatively using a paired-sample t-test. This test was used because the research design was within-subjects, where each athlete experienced both treatment conditions, resulting in paired data. This t-test aimed to determine whether there was a statistically significant difference between the athletes' performance after receiving verbal communication and after receiving demonstration communication. The significance value (p-value) was used to determine the effectiveness of each method in improving high jump technique skills.

Table 2. Research Implementation Procedures

No	Stage	Activity	Duration/ Time	Information
1	Selection and briefing	Selection of 10 athletes and explanation of research procedures	1 day (H-1)	Technical briefing
2	Pre-test Phase 1	3 high jump push → initial jump height measurement	± 30 minutes	Without treatment
3	Treatment 1	High jump technique training using the verbal method	± 45–60 minutes	Implementation of treatment 1 (verbal method)
4	Post-test Phase 1	3 rejections after training → measurement of results	± 30 minutes	To see the effect of the first treatment
5	Washout Period	Break between technique exercises → light exercises (mobility, stretching, light cardio)	3–5 days	To eliminate the effects of the first treatment
6	Pre-test Phase 2	3 rejections → re-measure the baseline before the second treatment	± 30 minutes	To ensure there are no residual effects
7	Treatment 2	High jump technique training using the demonstration method	± 45–60 minutes	Implementation of treatment 2 (demonstration method)
8	Post-test Phase 2	3 rejections after training → final result measurement	± 30 minutes	To see the effect of the second treatment
9	Final data collection	Recapitulation & storage of measurement data	1 day (after Phase 2)	Data prepared for statistical analysis

3. Results

Based on the data collected in the study, data were obtained from 10 research samples with a within-subjects or repeated measures design. Furthermore, before the data was processed and analyzed with more in-depth hypothesis testing, a normality test was required to ensure the analysis was in accordance with the normality test results obtained. Based on Table 3 below, the Shapiro-Wilk normality test explains that:

Table 3. Tests of Normality Shapiro-Wilk

Group	Long Jump			SECTS		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Verbal	.887	10	.157	.965	10	.846
Demonstration	.918	10	.341	.902	10	.232

Normality tests for the high jump and SECTS results data were conducted using the Shapiro-Wilk test, which is appropriate for small sample sizes. The focus of the test was to determine whether the gain data (the difference between pre-test and post-test scores) for each method, verbal and demonstration, were normally distributed, as a prerequisite for using parametric tests.

The test results for the high jump data showed a significance value (Sig.) for the verbal method of 0.157, while for the demonstration method it was 0.341. Both values were greater than the 0.05 significance threshold. This indicates that the distribution of the gain data for both methods did not deviate significantly from a normal distribution, thus concluding that the data were normally distributed.

Similarly, in the normality test results for the SECTS data, the Shapiro-Wilk significance value for the verbal method was 0.232, and for the demonstration method, it was 0.517. Both were also greater than 0.05, indicating that the distribution of the SECTS data in both intervention groups was also considered normal.

Thus, the results of the normality test indicate that the data for both variables, physical performance (high jump) and team communication skills (SECTS), meet the assumption of normality. This allows for the valid and accurate use of parametric tests such as the paired sample t-test, to analyze the effectiveness of verbal and demonstration methods in coach-athlete communication programs. The results of the Paired Samples Test can be seen in Tables 4 and 5.

A two-sided p-value <0.001 for both methods indicates that the difference in the mean (pre-post) differences is highly unlikely if there is no true change (null hypothesis). In a paired t-test, the null hypothesis (H_0) states that the mean difference is equal to zero, while the alternative (H_1) states that the difference is not equal to zero (two-tailed). The p-value expresses the probability of obtaining a result at least as extreme as the one observed if H_0 is true. A very small p-value (less than the common threshold of α=0.05) means the observed results are highly inconsistent with the assumption of no change. With a p-value <0.001, both the verbal and demonstration methods demonstrate the benefit of the intervention with very high confidence (confidence level >99.9%).

Because the test is two-sided, the difference could be in the direction of either an increase or a decrease; a p-value <0.001 implies that the mean change is in the extreme tails of the distribution in one or both directions. Implicitly, these results support the rejection of H_0 in both groups, indicating that the intervention resulted in significant changes in high jump performance. The practical result: both verbal and demonstration methods were equally effective in improving athlete performance.

In the paired sample t-test on the SECTS instrument for the two intervention methods the Verbal Method and the Demonstration Method, both two-sided p-values were recorded as being <0.001. This means the probability of obtaining a difference in pre- and post-intervention scores as large as the one observed (or more extreme) is nearly zero if there is no true change (H_0 is true). With $p<0.001$, we are very confident (more than 99.9%) that the intervention actually resulted in an increase in effective communication skills in team sports.

Because the test is two-sided, this p-value reflects the probability of a significant difference in either direction (an increase or a decrease). However, the differences reflected are positive, indicating that the intervention did indeed improve communication skills. The SECTS instrument itself is a reliable and valid tool commonly used to measure communication effectiveness in sports teams, with four main dimensions: Acceptance, Distinctiveness, Positive Conflict, and Negative Conflict. The $p<0.001$ result provides strong evidence that both methods—both verbal and demonstration-have a significant effect on effective communication skills in the context of sports teams.

Thus, the null hypothesis ("no difference") is rejected, and the results support the alternative hypothesis that the intervention improves SECTS scores. This significance value supports the use of the method in interpersonal communication improvement programs.

To see the methods that are appropriate to the FMS level and recommendations from this research, please see Table 6.

In Table 6, of the 10 participants, 6 had FMS scores in the high category (≥18), with a range of 18 to 21. The other 4 participants were in the moderate category (<18), with a range of 10 to 12. In the moderate category, the verbal method provided a fairly stable and even improvement, with an average of 7.5 points, while the demonstration method was slightly higher, at 8.3 points, but the difference was not significant. This makes the verbal method more recommended for this group because it is easier to implement.

Conversely, the high FMS group showed a very significant difference between the two methods. The demonstration method provided a significantly greater performance boost, with an average improvement of 17.5 points compared to only 6.3 points for the verbal method. Therefore, the demonstration method is more appropriate for athletes with high functional movement capacity to achieve optimal results.

Table 4. Paired Samples Test between Method with High Jump Results

	Paired Differences			t	df	Significance	
	Mean	Std. Dev	Std. Error Mean			One-Sided p	Two-Sided p
Pre-Post Test High Jump (Verbal Method)	-7.00	2.582	.816	-8.573	9	<.001	<.001
Pre-Post Test High Jump (Demonstration Method)	-12.00	7.528	2.380	-5.041	9	<.001	<.001

Table 5. Paired Sample Test between Method and Effectiveness of Coach-Athlete Communication

	Paired Differences			t	df	Significance	
	Mean	Std. Dev	Std. Error Mean			One-Sided p	Two-Sided p
Pre-Post Test SECTS (Verbal Method)	-11.30	5.945	1.88	-6.01	9	<.001	<.001
Pre-Post Test SECTS (Demonstration Method)	-12.80	6.161	1.94	-6.57	9	<.001	<.001

Table 6. Recommended Communication Methods

FMS Category	Number of Samples	FMS Score Range	Verbal Method Improvement	Demonstration Method Improvement	Recommended Methods
Moderate (<18)	4	10 – 12	5–10 points, average ≈7.5	5–10 points, average ≈8.3	Verbal, more stable and practical
High (≥18)	6	18 – 21	5–10 points, average ≈6.3	10–25 points, average ≈17.5	Demonstration, much higher results

4. Discussion

This improvement suggests that direct instruction and verbal cues are effective pedagogical tools for enhancing motor skill acquisition and refinement in athletic contexts [31]. The observed efficacy aligns with findings that emphasize the importance of communication strategies, including verbal instructions, in optimizing athlete performance and overall well-being [31], [32]. Specifically, external focus instructions have been shown to significantly enhance maximum jump height, indicating their utility in performance-oriented training. Conversely, internal focus instructions are more conducive to increasing muscle activity, which may be beneficial for strength development rather than for immediate performance metrics like jump height [33]. However, despite initial performance gains, studies suggest that prescriptive verbal instructions alone may not guarantee long-term learning outcomes, particularly in terms of transferability of skills. This highlights the need for coaches to consider not only how to instruct movement skills, but also when and why, to ensure a deeper, more enduring understanding [34]. Therefore, integrating direct demonstration with verbal instructions within a comprehensive communication strategy, as employed by the SMCR program, likely facilitates both immediate performance enhancements and the retention of learned skills. This integrated approach ensures that athletes not only comprehend the mechanics of a skill through demonstration but also internalize the underlying principles via targeted verbal cues, thereby fostering more robust learning and skill transfer [35]. Moreover, effective communication strategies in sports, encompassing both verbal and non-verbal elements, significantly impact athlete motivation, skill acquisition, performance, and overall satisfaction [31], [36]. The combination of high motor competence and neuro-linguistic programming has been shown to produce the most effective learning outcomes, suggesting an optimal alignment between individual capability and instructional strategy [37].

This indicates that the program successfully fostered a more supportive and effective communication environment between coaches and athletes, critical for optimizing performance and relational dynamics [38]. Indeed, effective communication, characterized by supportive behaviors and targeted feedback rather than excessive instructions, can prevent player concentration loss and negatively impact performance [39]. This underscores the importance of a balanced instructional approach, as excessive verbal instructions, particularly those with a highly technical focus, can detrimentally affect performance and increase movement variability [34]. Furthermore, research suggests that overly explicit verbal instructions can acutely impair motor performance, potentially by inducing greater cognitive load and hindering the automaticity of movement execution [34]. This perspective highlights the necessity for coaches to discern when to provide explicit guidance and when to allow for more implicit, discovery-based learning, thereby maximizing the benefits of both direct demonstration and verbal instruction while minimizing potential detriments. Therefore, a judicious blend of direct demonstration and concise, pertinent verbal cues is crucial for fostering not only immediate skill acquisition but also long-term athletic development and improved coach-athlete relationships [39]. This integrated approach enhances team coordination and overall performance by fostering clearer understanding and stronger interpersonal connections within the sporting environment. These communication strategies, encompassing both instructional methods and feedback, significantly impact decision-making, skill execution, and overall game performance [40]. Specifically, dynamic visual supports have been shown to be superior to static counterparts in motor skill acquisition involving whole-body movements, suggesting that direct demonstrations are highly effective [41]. This is particularly relevant for complex motor skills where observational learning from a clear, dynamic demonstration can convey nuanced movement patterns more efficiently than verbal descriptions alone. Moreover, effective coach-athlete communication, encompassing both verbal and non-verbal cues, is pivotal for fostering strong relationships, enhancing skill development, and improving overall athlete satisfaction and team success [42]. Such communication can clarify ambiguities, particularly when novel verbal instructions might lead to varied interpretations and unwanted movement variability [34]. Therefore, the SMCR program's emphasis on direct demonstration, coupled with judicious verbal instruction, likely mitigates these issues by providing a clear, unambiguous model for athletes to emulate while reinforcing key aspects of the movement. This dual approach ensures that athletes can better detect and correct errors in their performance, bridging the gap between visual input and motor execution [43]. This integrated strategy, which combines explicit and implicit learning mechanisms, promotes self-organization in motor skill development and aligns with non-representational frameworks emphasizing the coupling of perception and action [44]. This ecological approach to skill acquisition underscores that augmented information, judiciously provided, can guide athletes in their search for functional movement solutions and facilitate self-regulation in practice [10]. Furthermore, coaches should consider that team coordination and performance are significantly enhanced through communication training sessions that incorporate both verbal and non-verbal elements [45].

However, for optimal learning outcomes, especially for complex motor skills, dynamic visualizations such as video modeling by experts, particularly when presented in the morning, have been shown to be superior to static presentations [41]. This suggests that coaches should strategically employ instructional videos, particularly early in the day, to communicate tactical skills effectively in sports like basketball [41]. This differentiated approach to

instruction, aligning communication methods with athlete skill levels, is critical for enhancing performance satisfaction and fostering positive coach-athlete relationships [46], [47]. This implies that coaches should adapt their communication strategies not only based on the complexity of the skill but also on the athletes' existing foundational motor competencies, recognizing that explicit verbal instruction may be more beneficial for those with developing skills, while demonstrations are more effective for refining the skills of advanced athletes [34], [48]. Indeed, instructional visualization, whether dynamic or static, significantly impacts motor skill acquisition, with morning presentations generally leading to better short-term learning (Rekik et al., 2023). This temporal advantage is consistent with findings indicating that cognitive processing, including the retention of information, is more efficient in the morning due to lower arousal levels compared to the afternoon [41]. These temporal considerations, combined with the specificity of instructional methods, underscore the importance of tailored pedagogical strategies in sports coaching to optimize learning and performance outcomes. For instance, the use of video analysis, particularly in football, can bridge the gap between tactical, physical, and technical performance by integrating psychological aspects such as communication patterns and nonverbal behaviors into game analysis. This comprehensive approach allows for a more holistic understanding of player interactions and decision-making processes under pressure, which is crucial for developing effective communication strategies in team sports. The effectiveness of such strategies is further modulated by the time of day, with evidence suggesting that morning sessions generally yield superior learning outcomes due to reduced mental fatigue and enhanced cognitive processing [41]. This temporal sensitivity underscores the importance of scheduling critical instructional sessions, particularly those involving complex motor skill acquisition, during periods of peak cognitive function [41]. These findings highlight the necessity for coaches to meticulously plan their instructional delivery, integrating both the content and the timing of communication to maximize learning efficacy and athlete development [10], [49].

The findings of this study have direct implications for coaches in various sports. First, coaches can tailor communication methods based on athletes' functional motor abilities: for athletes with high FMS, demonstration methods are more effective in improving technical performance, while athletes with moderate FMS respond better to more structured verbal instructions. This suggests that coaches should conduct an initial assessment of athletes' motor capacity before selecting a communication approach. Furthermore, strategic integration of verbal and demonstration can be used in daily training sessions to maximize skill comprehension and retention, particularly when teaching complex techniques. In team sports such as basketball or soccer, the use of dynamic demonstrations and body language can also improve team cohesion and accelerate the processing of tactical information. These findings support coaches in focusing not only on what is taught, but also on how it is delivered, tailored to the characteristics of the athletes and the sport context.

5. Conclusions

Based on the research results, interventions using verbal communication and demonstration methods have been shown to have a significant impact on improving physical performance (high jump) and interpersonal communication skills in the context of team sports (SECTS). This is indicated by a two-sided significance value (p-value) of <0.001 in the paired sample t-test for both variables. This value is well below the 0.05 significance threshold, indicating a very small probability of a large increase occurring by chance. Therefore, the null hypothesis (H_0) stating no difference before and after the intervention can be rejected, and the alternative hypothesis (H_a) stating an effect of the intervention can be accepted with a confidence level greater than 99.9%.

Practically, both communication methods were equally effective in improving athlete performance and team communication effectiveness. However, further analysis considering functional movement ability (FMS) levels indicated the need for different approaches. For athletes with moderate FMS (<18), the verbal method produced stable and easily implemented improvements, making it more recommended. Meanwhile, for athletes with a high FMS (≥18), the demonstration method provided significantly more improvement, making it a more appropriate choice. These findings support the importance of tailoring communication methods based on individual athlete characteristics to optimize both physical and social training outcomes.

6. Research Limitations

This study has several limitations that should be noted. First, the small sample size (10 participants) limits the generalizability of the findings to a broader population. While the within-subject design helps reduce individual variability, the results remain underrepresented across athletes with different skill levels or backgrounds. Second, the intervention was conducted over a short period of time, consisting of only one session for each method (verbal and demonstration), making it impossible to measure long-term impacts on skill acquisition or retention. Third, this study did not consider psychological factors or individual preferences such as learning style, motivation, or relationship with the coach, which could potentially influence communication effectiveness. Finally, although the FMS was used as an indicator of motor capacity, the relationship between motor capacity and the effectiveness

of communication methods has not been analyzed in depth. This limitation opens up opportunities for further research with a broader and more in-depth approach.

7. Future Research Directions

Future research is recommended to involve larger and more diverse samples to increase external validity, including athletes of varying skill levels, ages, and sporting backgrounds. Longitudinal studies are also needed to evaluate the long-term impact of coach communication methods on skill retention, adaptation in competitive contexts, and the ongoing development of athlete performance. Furthermore, it is important to explore the effectiveness of this communication method in other sports that also require complex motor skills, such as gymnastics or soccer, to determine the consistency of results across contexts. Future research could also combine verbal and demonstrative communication approaches with modern learning technologies such as video modeling or augmented feedback. Finally, psychological factors such as motivation, learning styles, and the quality of the coach-athlete relationship should be included as research variables to gain a more holistic understanding of the effectiveness of communication in sports training.

Conflict of Interest

The authors declare that there were no commercial or financial connections that could be viewed as a potential conflict of interest throughout the course of the study.

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