

Impact of verbal instruction and demonstration methods on self-efficacy and motor learning in inexperienced handball players

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Abstract:

Different teaching strategies during learning process can contribute to a better development of tactical-technical behaviors. Thus, the aim of this study was to investigate the impact of verbal instruction and demonstration method on self-efficacy and motor learning in inexperienced handball players. 20 subjects (21.6±1.64 years) without experience on handball participated in the study. They were randomized in four groups: instruction group – IG (n = 5); instruction mirror group – IMG (n = 5); demonstration group – DG (n=5); and demonstration mirror group – DMG (n = 5). The task required was to dribble the ball and shooting it on goal. Each group performed four blocks of 10 repetitions each. Players were evaluated through qualitative movement analysis. To compare pre and post self-efficacy, paired t test was used. To identify possible differences across the different moments of the study, repeated measures ANOVA was used ($p < 0.05$). Results indicated that there were no differences observed on motor learning when comparing the teaching methods through the blocks ($F_{3,48} = 1.664$; $p = 0.187$; $\eta^2 = 0.199$). Self-efficacy on the specific task didn't improve before and after repetitions. It can be concluded that there was not improvement on technical-tactical domains using both methods to teach sports. It is suggested that new studies perform longitudinal approaches with the aim to understand the effects of these methods along weeks.

Key words: handball, motor learning, verbal instruction, demonstration.

Introduction

The context of motor learning involves various phenomena related to everyday life, and it is characterized as an intentional and planned effort, with the aim to reach economic, accurate and efficient motor execution (Guthrie et al., 1952; Ugrinowitsch and Benda, 2011).

In sports domain, some studies have been done with the aim to understand the variables that influence technical and tactical learning. Knowledge of the results (Vieira et al., 2013), focus of attention (Castaneda and Gray, 2007), setting goals (Marques et al., 2014), effects of different numbers of demonstration (Bruzzi et al., 2006) and stages of motor learning (Silveira, 2010) have been reported by literature as factors that can contribute for development of skills. Independently of the sport, motor learning may be dependent of many factors that occur throughout the training process, like feedback (Chiviacowsky et al. 2009), verbal instruction and demonstration (Fagundes, Chen and Laguna, 2013). While in demonstration method occurs the transfer of spatial and temporal movement information that allow the subject to develop a cognitive representation about the action, in instruction method subjects receive verbal instruction, improving then cognitive representation about the specific task (Bruzzi et al., 2006). In this sense, some scientific soundness suggested that demonstration method represents a better way to teach sports (Publio, Tani, Manoel, 1995; Al-Abood, Davids and Bennet, 2001). Specifically, about the training process of handball players, few researches have actually analyzed how players learn better technical-tactical aspects. Ricci et al., (2011) and Balakrishnan, Rengasamy and Aman (2011) demonstrated that teaching processes focused on game understanding improved tactical and technical capacities, but both didn't refer if they used verbal or demonstration instruction. Thus, it becomes unclear whether demonstration method represents a better way to teach handball, considering inexperienced players. Therefore, the aim of this study was to investigate the impact of verbal instruction and demonstration method on motor learning and self-efficacy in inexperienced handball players.

Material & methods

Participants

Sample was intentionally selected to participate of this study. Were pre selected to participate of the study 80 university students at State University of Maringá – Brazil. As exclusion criteria, subjects shouldn't

present training experience on handball. Final sample was composed by 20 university students (21.6 ± 1.64 years). Project was approved by local ethic committee (Proc. 628/11).

Experimental design

Motor task required was to dribble the ball and shoot it on goal. To reach this aim, participants were randomized into 4 experimental groups: instruction group ($n = 5$); instruction mirror group ($n = 5$); demonstration group ($n = 5$); and demonstration mirror group ($n = 5$). Subjects were recorded with a digital Samsung HMX-F80 according to the following figure:

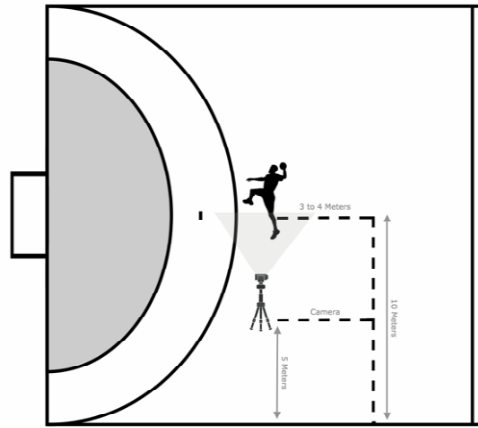


Fig. 1. Illustration regarding experimental design

Independently of the group, all subjects received the same general instruction at the beginning: “Participant: your task will be: move toward the goal using three steps, maintaining ball possession and shoot it at the goal”. After that, each group had to follow specific instruction related to its grouping.

In instruction group, learners asked verbal instruction how many times they judge necessary to perform the new movement correctly. It was conceded the follow verbal instruction about the movement: “From the starting point, hold the ball with both hands in front of the trunk, put a leg forward flexing the knee. After that, put the other leg forward flexing the knee. Repeat the first pass perform a jump holding the ball just with one hand. On the jumping moment, try to keep your balance and throw the ball in the direction of the goal before landing”.

As this movement present two different parts related to upper and lower limbs, two plus information were given. The specific instruction for lower limbs was: “pay attention with knee flexion when carrying out running. When you are jumping, flex your knee to gain impulsions. In the air, keep your legs in balance so the flight moment will be less troubled and, when landing, flex the lower limbs joints to absorb shock.

For upper limbs, verbal instruction was: “At the moment of the movement keep the arms semi-flexed in front of the body. At the jump time, keep the ball in both hands to keep it in your possession, in the aerial phase pass the ball to the dominant arm by stretching the shoulder back, doing the arm lever, shoulder adduction, elbow extension and flexion of the wrist”. In instruction mirror group, learners were matched to the choices of the instruction group.

Players of demonstration group requested video demonstration how many times they needed to built a cognitive model of the movement. Thus, were presented two videos where professional handball athletes performed the same task. In demonstration mirror group, learners were matched to the choices of the demonstration group.

The four groups realized four blocks of 10 repetitions each: block 1 (B1), block 2 (B2), block 3 (B3) and retention (R), totaling 800 technical-tactical actions analyzed.

Motor learning assessment instrument

Due the low quantity of instruments to assess technical-tactical handball actions, a checklist qualitative movement was built and this tool was used in video analysis. It consists in a short introduction paragraph which explain, according to specialists in team sports, all proceeding related to dribble the ball and shooting it on goal. All movements were deeply described and divided into five moments: “first step”, “second step”, “third step”, “flight phase” and “shoot on goal”. Each moment presented four descriptions related to the right and to the left body side.

An expert committee composed by three coaches of handball performed a content validity, obtaining an agreement above 80% in all items related to the instrument (Cronbach’s $\alpha = 0.80$).

After validity proceeding, players were evaluated by two experts who assessed players according to the checklist qualitative movement. If the players performed correctly the movement, 2 points were granted. If

described movement was partially correct, 1 point was computed and, if the player performed wrongly the movement, evaluator should grant 0 points. Thus, total score for each moment was 8 points.

Self-efficacy instrument

A self-efficacy questionnaire developed and validated by Bandura (2006) was used in this study. Main objective is to evaluate how much the individual feels capable of performing the required task. The questionnaire contains questions related to the following topics: i) motor skill (goal shifting); ii) creation of strategies to carry out the task; (iii) ability to monitor their practice situation; and iv) the capacity for decision-making. The likert-scale of evaluation of the questionnaire goes from 0 (zero) to 100 (hundred) in ascending order of the judgment of his competence.

Statistical analysis

Mean and standard deviation were used to characterize the sample. To analyze the normality of data, Shapiro-Wilk test was applied. Due the fact that data presented parametric distribution, repeated measures ANOVA was used to compare different moments of experimental design (P1, P2, P3 and R). Regarding comparison of pre and post self-efficacy, paired t test was carried out. To analyze the reliability of checklist qualitative movement, Cronbach's alpha was used. Values of $\alpha=0,80$ reveal a good internal consistency. Significance level was set at 5%.

Results

Table 1 presents descriptive statistics and comparison among the four experimental moments. As can be observed, there weren't observed any significant difference between the blocks. Mean values were similar even in retention moment ($F_{3,48} = 1.664$; $p = 0.187$; $\eta^2 = 0.199$).

Table 1. Comparison among different teaching methods across the four experimental moments in inexperienced handball players.

	Block 1	Block 2	Block 3	Retention	F	p
	M ± SD	M ± SD	M ± SD	M ± SD		
DG (score)	20.60 ± 4.17	21.10 ± 5.34	21.80 ± 7.42	22.10 ± 6.76	0.404	0.753
DMG (score)	19.40 ± 6.80	21.70 ± 7.42	21.10 ± 5.58	25.90 ± 8.80	0.937	0.421
IG (score)	28.20 ± 5.80	27.70 ± 5.64	26.50 ± 4.48	27.10 ± 5.30	3.647	0.050
IMG (score)	22.10 ± 6.76	25.90 ± 8.80	25.30 ± 7.26	26.10 ± 7.08	2.043	0.162

Note = DG: Demonstration group; DMG: Demonstration mirror group; IG: Instruction group; IMG: Instruction mirror group.

The absence of differences suggests the similarity of efficiency in both methods to teach this motor skill in handball inexperienced players.

Table 2. Comparison of pre and post self-efficacy of the four experimental groups in inexperienced handball players.

	Pre-test	Post-test	F	p
	M ± SD	M ± SD		
DG (score)	76.23±9.15	82.50±8.40	0.404	0.169
DMG (score)	60.45±16.62	64.91±8.64	0.937	0.470
IG (score)	69.91±12.99	73.00±16.96	3.647	0.099
IMG (score)	56.64±12.41	55.55± 19.01	2.043	0.548

Note = DG: Demonstration group; DMG: Demonstration mirror group; IG: Instruction group; IMG: Instruction mirror group.

With regard to table 2, comparison indicated that players didn't improve self-efficacy when compared pre and post experimental moments, what mean that both methods also weren't capable to improve this variable.

Discussion

The aim of the study was to investigate the impact of verbal instruction and demonstration method on self-efficacy and motor learning in inexperienced handball players. Main findings indicated that motor performance and self-efficacy didn't suffer changing across the experimental blocks, what mean that both verbal and demonstration methods weren't capable to improve self-efficacy and were equal to teach motor skills in inexperienced handball players.

Although the study conducted by Publio et al. (1995) concluded that verbal instruction is not recommended for who are starting motor skills and demonstration method was more effective to teach technical skills, when compared the groups with its mirror, motor learning was not observed in all cases. These results agree with the findings of the current study, where through qualitative movement analysis was not possible to identify significant difference among groups (table 1), what suggest a similarity of effects of both methods when used to teach adults.

Darido (1989) conducted a study on demonstration in motor learning, which brought some variables that influence motor learning. The author states that demonstration should be neglected in teaching closed abilities in the early stages of learning. The author also points out that subjects of the same sex and skill experts have made it easier to assimilate the task to be taught. In addition, Lazarin (2003) who conducted a study on the acquisition of motor skills in handball in children aged 9 to 11 years, concluded that the demonstration assists much more in constructing temporal space than verbal instruction due to the child still being in the development process and therefore not properly assimilate the instruction.

Ennes (2008) states that there is no doubt that verbal demonstration and instruction help in the process of acquiring motor skills in sports, even if there are different theoretical explanations for the phenomenon. Ennes (2004), which aimed to evaluate the effects of combination of demonstration, verbal instruction and frequency of knowledge of results in the acquisition of motor skills highlights the importance of demonstration for learning.

According to what has been pointed out in the above mentioned studies, we can verify that the amount of demonstrative instruction, in our case video demonstration performed by an expert, does not influence the individual's learning, which helps to explain the absence of significant differences (table 1). The study conducted by Ennes (2004) contributes to this assertion, because among the groups that had a choice and the groups that did not have a choice there was no statistically significant difference, in this case, regardless of the amount of demonstration that the individuals requested, this did not influence the apprehension of the proposed ability.

McCullagh (1993) observed that in tasks that involved time or that were serial (had a sequel in performing them) verbal instruction proved to be more effective than the demonstration method. Thus, we verified that physical education area still presents some divergences about demonstration and verbal methods to teach sports, what suggest the needed of future researches to explore this research field.

The other analyzed variable of the current study, the self-efficacy didn't improve between the two moments (pre and post tests). There weren't identified significant differences between these two moments. Therefore, results presented in table 2 were contrary to expectations, because according to Bandura (1986, 1989, 1993), the function of this judgment serves for the learner to put a direction in the learning, more attentive to items addressed in the belief. This makes us affirm that the belief in self-efficacy, besides being an instrument for analyzing the level of learning that individuals feel, serves for learning as well.

As final considerations, we consider that the number of subjects who participated of this study was a possible limitation of this research. However, the results contribute to the understanding of how motor skill learning in inexperienced handball players happens. It seems that both teaching methods (verbal and demonstration) weren't capable to improve technical skills related to dribble the ball and shooting it on goal.

Further studies involving learning methods, verbal instruction and demonstration are needed so that we can have a consensus from the scientific community of which learning method is most effective in certain types of tasks. There are few studies that go deeper into the subject in collective sports modalities. It is proposed that new researches about motor learning with sports skills be carried out with a larger sample than the present study, because this way we may observe different variables than those pointed out in this article.

Conclusions

It can be concluded that for the belief in self-efficacy in the task of dribbling the ball and throwing a goal in the handball the subjects answered that the learning was not significant for them, in general they did not feel the learning using verbal and demonstration methods. Also, motor performance in dribbling the ball and shoot it on goal was not improved when coaches used these methods in adults inexperienced handball players.

Conflicts of interest - The authors declare that there are no conflicts of interest.

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