The Possibility of Using Sign and Symbolic Tools in the Development of Motor Skills by Beginning Soccer Players

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Abstract

This article analyzes the use of iconic and symbolic tools by young athletes in the development of concrete motor skills. The study involved 22 young athletes, aged 5–6 years, attending a soccer school in Moscow, Russia. The methodological procedure included using specifically designed mini-movies, which were short video clips employing different sign and symbolic tools for mastering alternate dribbling using the inner and outer side of the foot and the subsequent kick of the ball toward the net. The results showed the effectiveness of these tools when working with young soccer players.

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Selection and/or peer-review under responsibility of PSIWORLD 2012

Keywords: sport; sport psychology; motor skill; sign; symbol; metaphor; image

1. Problem statement and motivation

Vygotsky formulated theses on the systemic and semantic structure of consciousness [15]. Meanwhile effectiveness of using sign and symbolic representations as a specific technique was demonstrated in a number of works devoted to the development of motor skills [4], [11], [14]. We have turned to the study of metaphor as this form of symbolic expression is closer to the symbol on the “sign-symbol” axis [9].

In sport psychology, metaphor is considered an effective tool when working with athletes [6]. In such cases, the emotional function of metaphor comes to the fore. For example, Hanin’s research shows that metaphor is used spontaneously by athletes to express their emotional state [5]. Moreover, sometimes only metaphorical language is available for athletes to describe emotions they are experiencing [13].

In sport, metaphor as an agent of cognition is also used to separate implicit learning from explicit learning. “When individuals accumulate knowledge passively and no conscious analytic strategies are used, the learning
process is considered implicit. ... Implicit learning is passive[,] without perceived use of analytical strategies. ... Knowledge acquired through explicit learning is accessible to consciousness and can be articulated” [8].

For example, it has been shown that professional batters have limited knowledge of the kinematics of proper motions, so close attention to them reduces the success of their actions [4].

Implicit learning does not involve loading the individual’s working memory, so its success has no correlation with IQ (as opposed to explicit learning) [12]. Masters [10] has proposed that the reduced effectiveness of performing any sport activity as a result of stress can be explained by appeal to explicit knowledge. If the athlete has automatically achieved performance as a result of explicit instruction, later, in a stressful situation, the automatic skill fails, and the participant requires resources to reproduce the explicit knowledge. Therefore, according to Masters [10], an effective way to counteract stress factors is by minimizing explicit knowledge and therefore explicit teaching.

In the literature the age at which individuals acquire metaphors and can manipulate them freely is extensively discussed [7]. The research shows that already at preschool age children can understand metaphors.

The general aim of this study was to investigate whether metaphor is an effective tool for developing sport skills in young children.

2. Methods

2.1. Participants

The participants were young athletes, aged 5–6 years (N = 22, M = 5.7 years), attending the Chertanovo Sport School in Moscow, Russia. The participants were divided into two groups so that ages and general physical ability were the same in both groups; physical ability was measured by the development of characteristics important in soccer such as speed, agility, and endurance. The main difference in the training of the two groups of players consisted in using either sign tools or metaphors to develop certain movements.

The group of participants in which the sign tools were used consisted of 10 players, and the group in which metaphors were used contained 12 players. The procedure for implementing the intervention was similar for both groups of participants. In the course of the research, all athletes continued their usual physical exercises in the same way as before the intervention.

2.2. Measures

2.2.1. Performance Rates.

The central motor skill to be developed was alternate dribbling by the outer and inner side of one foot, ending with a kick of the ball directed to the net. The choice of motor skill as an object of research was determined through consultations with the coaches; the choice takes into account both the age characteristics of this group of athletes and their physical ability.

Monitoring the success of the training in developing players’ motor skills was conducted by controlling changes in individual indicators of dribbling. Monitoring was carried out by watching videos of the athletes’ movements.

2.2.2. Sign and Symbolic Tools.

The main methodological procedures used in the intervention were mini-movies modeled specifically for each group of athletes (those who were learning through sign tools and those who were learning by using metaphors). These short videos (30 seconds each) used a variety of signs and symbolic tools of alternate dribbling by the outer and inner side of one foot, ending with a kick of the ball toward the net.
Results of time perception researches have shown that the accuracy and reliability reproduction of time intervals depend on the context and the duration of these intervals [1], [2]. Therefore, in this case both video clips had identical timing.

They were starting and ending camera shots, which showed a coach performing the movement. The central fragments of the video clips were different. The first of them, for the athletes in the sign-tools group, was a drawing of a human being’s performance of the movements (see Figure 1a).

In the second clip, designed for the metaphors group in the form of an animated cartoon, a symbolic image of the movement was presented (see Figure 1b). In it a two-headed snake is making zigzag movements (similar to the coach’s leg movements) and is chasing the mouse (the ball), which runs around a pebble (symbolizing the training rack) and hides in a burrow (reflecting the net) after the snake pushes it.

The athletes were individually invited to watch the mini-movie for their group once and then to answer questions that focused attention on the general plot of the movie and the actions performed by each of the characters.

Fig. 1. a) A scene from the mini-movie for the sign-tools group; b) A scene from the mini-movie for the metaphors group

2.3. Procedure

The preparation phase of the research was devoted to analyzing the athletes’ abilities, specifying the motor skill that would be the object of analysis, and subsequently shooting the training mini-movies.

The main phase of the study was carried out during 4 weeks and included 12 individual sessions with the athletes. At each third meeting, each athlete’s mastery of the skills was monitored by video.

All the novice players found the practical classes of great interest. Despite the fact that they had a significant number of meetings in which they saw the same video clips, they watched them with great pleasure.

However, during the experiment, four participants discontinued attending the sport school and therefore were not included in the data processing.

3. Results and Discussion

The monitoring data were assessed by expert analysis of indicators that reflected the constituent elements of the movement (dribbling, directing the ball, kicking the ball). Moreover, in the coach interviews an integral
indicator of the movement development was added; this indicator assessed an athlete’s ability to integrate directing the ball, holding the direction, and kicking the ball in a given time. The results of the correlation analysis of success indicators confirm the value of the integral indicator. By using the Spearman correlation coefficient, we found statistically significant correlations at the p = 0.01 level for the integral indicator (r = 0.8), the direction of movement (r = 0.6), and the kick (r = 0, 8).

The Mann-Whitney test, performed during the preliminary stage of the study, showed no statistically significant differences between these groups on the success indicators: dribbling (p = 0.91), direction of movement (p = 0.44), final kick (p = 0.59), integral indicator of movement development (p = 0.67). In other words, prior to the intervention the two groups were indeed equivalent with respect to these indicators.

Application of the Wilcoxon test allowed us to compare the development of athletes’ movement before the intervention and after its completion. Thus, for the sign-tools group, comparisons of dribbling the ball, directing the ball, and the final kick, as well as of the integral indicator of movement development, indicate no significant shifts (p = 0.06, p = 0.71, p = 0.1, and p = 0.14, respectively). Assessment of the statistical significance of differences in the success of the metaphors-group athletes suggests the feasibility of using metaphors as a tool for developing motor skills.

The results show the presence of significant shifts in all parameters (dribbling: p = 0.046, directing the ball: p = 0.042, integral indicator of movement development: p = 0.46) with the exception of kicking the ball (p = 0.07). A possible explanation may be that the symbolic content of the mini-movie for this group focused more attention on dribbling the ball and directing the movement of the ball (the image of the two-headed snake making zigzag movements) than on kicking the ball (pushing the mouse to the burrow).

The results discount the possible correlation between the athletes’ regular attendance at physical training and the successful performance of the indicators because there are no statistically significant correlations between them. This fact points once again to the role of sign and symbolic tools in attaining the performance indicators but is a kind of confirmation also of the principle of effective construction of the training process: quantity is not always transformed into quality; only a qualitative quantity is transformed into quality.

4. Conclusion

The research confirmed the hypothesis in general that signs and symbolic tools for learning motor skills can be effective in working with young players. Athletes who used metaphor as an additional tool to master motor skills exhibited a more positive trend in the development of alternate dribbling by the outer and inner side of one foot, ending with a kick of the ball on target, than did the athletes who used sign tools.

Although it has been shown that sign and symbolic representations were used by young athletes as effective training techniques, our study has several limitations such as a small sample size and limited amount of experts – assessors (only four professional coaches were attended as experts in our study). Nevertheless, it is worth testing our approach on a different age group by means of conducting a new research on a larger sample of athletes.

Acknowledgments

The work was carried out in the frame of the federal program “Scientific and scientific-pedagogical personnel of innovative Russia” for 2009-2013.
References


