The role of coordinating capabilities in the formation of specific skills for the game of badminton

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Abstract. The use of the specific means of sports games during the physical education lesson completes the motor potential of each student, in order to obtain a higher level of the motor quality indices and the amplification of effort capacity. Success in badminton is related to the efficiency and effectiveness of the player's movement on the court and during the shots. Badminton players must develop a wide variety of shots and types of movements that must be able to be performed from different positions on the field, in different situations of the match, at different speeds, which also implies a high level of manifestation of coordination capabilities. The paper aims to demonstrate that their education determines the faster acquisition of technique.

Keywords: secondary school cycle physical education badminton coordination capabilities
**Introduction**

Through its technical-tactical and regulation characteristics, as well as through the rapid movement in the field that determines the dynamics of the specific effort, the game of badminton effectively contributes to the achievement of the objectives of education, harmonious physical development and maintaining an optimal state of health. Badminton is considered a complete, very fast game, especially by the flight speed of the feather ball which after impact with the racket during a smash shot can exceed 400 km/h, represents the fastest flight speed of a ball in a game sport. They determine a favorable influence of the game on the nervous system of the practitioners, explained by the trophic nature of the high frequency of sensory impulses that go to the cerebral cortex from the many hits on the ball with the racket and the rapid movement in the field, ensuring optimal excitability in the areas involved in directing and controlling movements with a stimulating role on mental processes [1].

Badminton players must react to the moving ball and adjust their body position continuously and quickly throughout the game. They have to control their center of gravity very well while performing very fast and asymmetrical movements of the upper limbs. Therefore, static and especially dynamic balance is crucial for badminton success and injury prevention. However, the balance skills of badminton players have not yet been fully examined [2]. Specialist studies reported that when standing on the non-dominant leg with their eyes closed, high-level badminton players swayed less than low-level players.

A study conducted on tennis players aged 9-13 years showed that differentiation and kinesthetic reaction as components of coordination are the most important skills in tennis [3].

The same authors [3] found that an additional coordination program in addition to tennis training significantly improved serve execution technique. Previous studies have shown that developing coordination improves performance in racket sports [4,5], along with accelerating the acquisition of the specific playing technique [6].

To date, only 3 studies have investigated hand-eye coordination in badminton players. Some experts suggested
that participation in badminton training was associated with superior visual hand-eye reaction time and very good visual-spatial intelligence. Dube, Mungal and Kulkarni [7] reported that the visual reaction time of badminton players was shorter than that of sedentary individuals. Regarding coordination capabilities, in general, they can be better influenced in the first half of someone’s life than in the second half.

The importance of coordinative abilities also emerges from the fact that they are the basis of sensorimotor learning, and the higher its level, the faster and more precise the learning of new movements will be [8].

At the beginning of the 90s, Ghe. Cârstea [9,10] specified that, among the practical methods used in physical education and sports, there is only one method, practice, which is also applied to the development of motor qualities, therefore also for skill, through the procedures: performing acts and motor actions in relatively constant conditions, in difficult conditions and in variable conditions.

Virgil Tudor [11] considers the coordinative capability as a component whose level is, to a large extent, genetically determined (specifications scientifically argued by several specialists) and, as such, its degree of trainability is lower.

According to T.O. Bompa [12], there are not many specific methods for the development of coordination, because it is a natural, inherited ability, but for subjects not endowed with a good coordination ability and who have a harder time acquiring complex skills, it is wrong to expect spectacular improvements.

Interesting are the opinions issued by G. Rață and BC Rață [13] regarding the methods of teaching coordination. The two are of the opinion that, coordination/skill can be educated differently, depending on age, gender and the level of possession and development of the other skills, considering the fact that it is part of the genetically determined skills, with a low degree of trainability.

In conclusion, the coordinative abilities have the role of developing motor skills, depending on the ability to direct and process the information coming from the analyzers involved in the movement. The primary role of coordinative abilities is manifested in motor learning, without appreciating that
the role of conditional abilities is less important.

The research aims to demonstrate that by teaching coordination, an acceleration of the acquisition of skills specific to the game of badminton is achieved.

The subjects who participated in the research are secondary school students from Berteștii de Jos Secondary School, Brăila County. Motor testing was performed on a sample of 40 students, 21 of whom were boys and 19 girls aged between 13 and 14. The tests were organized and carried out on two groups, namely the control group (20 students, 12 boys and 8 girls) and the experimental group (20 students, 9 boys and 11 girls).

In the first stage of the research, the initial tests were applied for both groups. The second stage consisted in the implementation of the developed planning documents, which aim to increase the level of acquisition of motor skills specific to the game of badminton, which is also the object of the research. In the third stage of the research the following were carried out: the final tests, the recording of the data in order to process them, the analysis of the data and the establishment of the degree of achievement of the proposed objectives and the confirmation or denial of the working hypothesis.

6 control samples were used to evaluate the level of acquisition of the skills specific to the game of badminton. These are, for example, the long serve, the short serve, the forehand with movement in different directions, the forehand from above, the backhand, and the backhand from different positions. These motor tests allowed us to appreciate the badminton players' ability to perform various specific procedures, but in isolated conditions.
**Long serve** - The student is located in the middle of the home court in the fundamental position and executes the long serve with the forehand shot at three markings drawn at distances of 1 m from each other in the opponent's court (fig. 1). Each marking corresponds to a number of points as follows: marking 1 – 5 points, marking 2 – 10 points, marking 3 – 15 points. After the explanation and demonstration, the player must make three consecutive shots at the three markings. Two attempts are given.

![Figure 2](image_url)

**Short serve** - The player is positioned in the court near the net. Similar to the long serve, he will execute three successive shots at three markings placed obliquely in the opponent's court. Each marking corresponds to a number of points as follows: marking 1 – 5 points, marking 2 – 10 points, marking 3 – 15 points (fig. 2). After the explanation and demonstration, the player must make three consecutive shots at the three markings. Two attempts are given.

![Figure 3](image_url)

**Forehand with lateral movement right, oblique right,**
**forward** - at the auditory signal of the teacher each student will execute the right stroke (forehand) of the flyer with lateral displacement, oblique, forward over the net in the marked areas. Each zone corresponds to a number of 5, 10 or 15 points depending on the accuracy of the shot (fig. 3). After the explanation and demonstration, the athlete performs a control attempt.

**Top Forehand** - the teacher will throw the flyer over each student's head. He must hit the flyer hard to reach the marked areas. Each area corresponds to a number of points, as follows: marking 1 - 5 points, marking 2 - 10 points, marking 3 - 15 points (fig. 4). After the explanation and demonstration, the athlete performs a control attempt.

**Backhand** - each student will make two sets of three left-hand shots in different areas marked on the court. Each zone has a number of points. After each ball hit, the player
returns to the initial position, noting the score obtained for that shot. The ball will be thrown by another student sitting two meters away from the performer (fig. 5). After the explanation and demonstration, the athlete performs a control attempt.

**Figure 6**

*Backhand from different positions* - two in a row in two rows facing each other at a distance of five meters from each other. Specific movements to the left side, obliquely to the left in the mirror will be performed with the grasping and throwing of the flyer (fig. 6). Each will throw and catch 10 times. Each correct execution is worth 3 points. After the explanation and demonstration, the athlete performs a control attempt.

In the development of the model specially designed for the development of coordinative capabilities, a certain sequence was taken into account in the application of the drive systems both within the developed links and the lessons as a whole. In the elaboration of this succession, all the previously presented methodical procedures were taken into account. In the first phase the drive systems are made up of simple segmental or global exercises. These should not require or stress the subjects, so they are known to them. Practising them will be done without time pressure, the workload is small, the intensity is medium, and the complexity is low. The second phase involves the resumption of the drive systems from the previous stage, but their exercise will be done with temporal conditioning. The third phase involves the modification of the internal structure of the respective
exercise, or/and the modification of the external conditions of exercise. It is recommended to first make changes in the internal structure of the movement and then in the conditions of practice. The complexity will be increased compared to the previous phases. The fourth phase involves the chaining of separately automated motor acts/actions and making the execution conditions more difficult. The complexity is increased in this case, and the time allocated can reach up to 60% of the time allocated to the respective link. The fifth and last phase involves the resumption of the fourth phase, but under time pressure. The complexity is very high, and the time allocated can reach up to 60% of the time affected by the respective link.

The averages from the measurements performed are presented in table 1.

**Table 1**

The evolution of the calculated statistical indicators of the execution technique specific to the game of badminton between the initial and the final testing

<table>
<thead>
<tr>
<th>No.</th>
<th>Trial name</th>
<th>Group exp. IT</th>
<th>Group exp. TF</th>
<th>TI control group</th>
<th>TF control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$\bar{x}$ d cv</td>
<td>$\bar{x}$ d cv</td>
<td>$\bar{x}$ d cv</td>
<td>$\bar{x}$ d cv</td>
</tr>
<tr>
<td>1.</td>
<td>Long serve (pts.)</td>
<td>22.5 6.7 30.09</td>
<td>26.5 4.12 15.53</td>
<td>22 5.87 26.68</td>
<td>24 4.59 19.14</td>
</tr>
<tr>
<td>3.</td>
<td>Forehand with displacement (pt.)</td>
<td>24.5 4.38 17.87</td>
<td>28 4.22 15.06</td>
<td>2.3 5.37 23.37</td>
<td>25.5 3.69 14.47</td>
</tr>
<tr>
<td>4.</td>
<td>Forehand (pt.)</td>
<td>19.5 5.9 28.22</td>
<td>26 5.16 19.86</td>
<td>21 5.16 24.59</td>
<td>24 5.16 21.52</td>
</tr>
<tr>
<td>5.</td>
<td>Backhand (pts.)</td>
<td>19.5 4.97 25.2</td>
<td>24 3.94 16.43</td>
<td>19 6.58 34.65</td>
<td>22 4.83 21.96</td>
</tr>
<tr>
<td>6.</td>
<td>Backhand from different positions (pts.)</td>
<td>17.7 6.7 37.86</td>
<td>19.8 5.69 28.75</td>
<td>17.1 5.3</td>
<td>31 18.6 3.41 18.31</td>
</tr>
</tbody>
</table>

For the long serve sample (fig. 7) we note that the difference between the two groups at the initial test is only 0.5 points. Thus, the control group achieved a performance of 22 points and the experimental group achieved 22.5 points.
The difference between the two groups is accentuated at the level of the final testing, when the control group achieves a performance of 24 points, and the experimental group accumulates 26.5 points. The difference between the groups is 2.5 points in favor of the experimental group. The control group has a 2-point improvement, while the experimental group has a 4-point improvement, so double, compared to the control group.

In the case of the second test (fig. 8) for evaluating the serve, the short serve, the evolution of both groups is positive. Both groups make improvements to the achieved environments. The control group makes an absolute improvement of 2 points (from 21 to 23 points), while the experimental group makes an absolute improvement of 4.5 points. Also, the coefficients of variability of both groups have a positive evolution, showing an average homogeneity at the final testing.
For the third sample, *forehand with displacement*, we see from fig. 9 that both groups have an increasing evolution. The control group evolves from 23 points to 25.5 points between the two tests, so it makes a progress of 2.5 points. The experimental group achieves a 3.5-point improvement, from 24.5 points at the initial test to 28 points at the final test. The calculated coefficient of variability indicates an average homogeneity for both groups.

![Figure 9](image)

*Figure 9*

Evolution of averages in the "Forehand with displacement" test

Forehand sample (fig. 10), we notice that at the level of the initial testing, the experimental group achieves a slightly lower group average than the control group, and the situation will change in the final testing. The experimental group performs better than the control group. Thus, the experimental group makes a progress of 3 points, while the experimental group makes a progress of 6.5 points, in absolute value.

![Figure 10](image)

*Figure 10*

The evolution of averages in the "Top Forehand" test
We have a similar situation in the case of the backhand test. Thus, in the case of the control group, we observe that the calculated average evolves from 19 points at the initial test, to 22 points at the final test. The progress in absolute value in the case of this group is 3 points, which represents a percentage increase of 15.79%. The experimental group recorded a progress of 4.5 points, which represents a percentage increase of 23.08%, given that the performance of this group evolved from 19.5 points at the initial test to 24 points at the final test (fig. 11). The difference in progress between the two groups is 1.5 points in favor of the experimental group.

![Backhand test graph]

Figure 11
The evolution of averages in the "Backhand" test

![Backhand from different positions test graph]

Figure 12
Evolution of averages in the "Backhand from different positions" test

The last test for evaluating the specific skills of the badminton game, backhand from different positions (fig. 12), indicates an increase in the performance of both groups. The experimental group achieves an improvement in the group mean in absolute value of 1.5 points, which in percentage means an
improvement of 8.77%. The same evolution is observed in the case of the experimental group. This evolves from an average of 17.7 points at the initial test to an average of 19.8 points at the final test. The progress of this group is 2.1 points, which indicates a percentage increase of 10.77%.

**Conclusions**

Analyzing to what extent the students of the experimental class responded to the educational contents of training and motor development by using the means specific to the development of coordinative capabilities, as well as the way in which the means used had an influence on the motor skills specific to the game of badminton, we came to the conclusion that the fulfillment of the specific skills can be achieved, through an optimal organization.

Following the course of the experimental research, we can conclude that the training program and the applied evaluations highlighted the evolution of the subjects included in the research, from the perspective of the development of motor skills and the learning of technical procedures specific to badminton. Also, the evaluation of the technical procedures highlighted higher values of the progress recorded in the experimental group compared to the control group, for all 6 samples used.

In our opinion, the development and testing of new training programs represent steps that could lead to overcoming the current boundaries of performances recorded in Romanian badminton, an approach that must be carried out constantly, in order to be able to offer as many practical solutions as possible to current and future specialists from the field.

**References:**

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