STUDY ON IMPROVING THE SEGMENTAL AND PLURISEGMENTAL COORDINATION OF THE FEMALE STUDENTS IN THE AEROBIC DANCE TEAM OF THE UNIVERSITY "POLITEHNICA" OF BUCHAREST

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Abstract

The ability to combine and associate movements differently, a component of the special coordination capacity, is an important factor in achieving the motor behavior specific to aerobic dance, directly conditioning both the technical and artistic performance. The purpose of the research is to optimize the training of the female students in the UPB's aerobic dance team, by developing and implementing a training program containing operational structures focused on improving the segmental and plurisegmental motor coordination, taking into account the requirements of this category of age. The research was carried out between 17.10.2016 – 31.03.2017 in the UPB aerobic gym on a sample of 28 subjects (girls) aged 18 to 20, divided into two equal groups: the experimental and control group. The comparative analysis of the final results for the two groups, in the assessment of the motor segmental and plurisegmental coordination, reveals statistically significant differences, thus confirming the research hypotheses. These differences can be explained by the different effects of the training program for the two groups (the experimental and control group).

Keywords: *coordinative capacity, segmental and plurisegmental coordination, operational structures, female students.*

JEL classification: *I20, I23, Z19*

Introduction

Coordinative capacities represent a "complex of psychomotor qualities, which presupposes the ability to quickly learn new movements, adapting rapidly and efficiently to various conditions, specific to different types of activities, by restructuring the existing motor pool" (Dragnea, 1999, pp. 197). The coordinative

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capacity is subdivided into general, specific coordination and coordination in the context of other motor qualities.

Specific (special) coordination develops within a sport discipline and represents the ability to combine the motor acts within the technical elements of practiced sport. "Specific coordination is manifested differently from one individual to another, from a sports branch, trial to another, from one body segment to another. The athlete increases the level of specific coordination through specific targeted training " (Rață, 2006, p. 250).

Within the classification of the specific coordinative capacity, a multitude of forms of manifestation are distinguished, so we have studied in the present paper the ability to combine and associate different movements. This allows the link between the automated motor skills and includes the segmental (between upper and lower limbs), plurisegmental (arms-legs-trunk) and general coordination (Manno, 1984, pp. 28).

In aerobic dance the motor repertoire involves the simultaneous participation of several segments in the making of a movement, for example, two types of different movements occur simultaneously: bending and stretching at the level of two or more segments, there being different plans and directions (senses) in marking asymmetric / symmetrical positions.

From a practical point of view, we believe that the development of the ability to combine and associate movements differently is a necessity in the aerobic dance lesson, as most exercises require good segmental, intersegmental and plurisegmental coordination, which should give the movements harmony and cursiveness.

1. **The purpose** of the research is to optimize the training of the female students in the UPB's aerobic dance team, by developing and implementing a training program containing operational structures focused on improving the segmental and plurisegmental motor coordination, taking into account the requirements of this category of age. The basic premise of the research: the ability to combine and associate movements differently, a component of the special coordination capacity, is an important factor in achieving the motor behavior specific to aerobic dance, directly conditioning both the technical and artistic performance.

2. Research Hypotheses

Determining the development of the segmental and plurisegmental coordination of the female students can facilitate the elaboration of a rational training program focused on operational systems that cover all the requirements of this age group.

Implementing an optimal instructional strategy in the training process, with the imprint of our contribution to improving the content and methodological efficiency used, can help improve the development of the segmental and

plurisegmental motor coordination.

3. Research Objectives

- establishing the degree of development of the segmental and plurisegmental motor coordination in the investigated subjects;
- identifying the optimal operational structures involved in the development of the capacity to combine and associate the movements differently, with emphasis on segmental, intersegmental and plurisegmental coordination;
- creating training programs containing specific means for developing and improving the ability to combine and to associate movements differently;
- experimental verification of the efficacy of the developed program.

4. Research Methods

The bibliographic documentation was used to acquire knowledge on the particularities of the coordinative component - segmental and plurisegmental coordination in aerobic dance, as well as of methods and means for optimizing it, as a prerequisite for the efficiency of female students' training.

The observation method consists in the recording of the data and the findings of interest, as they are presented in a concrete natural way, without the intention to modify them, the researcher expecting them to manifest themselves, to be able to get them (Epuran, 2005, pp. 2007). In the research we used the direct observation to gather concrete information about the behavior of the female students in the training process.

The experimental method

In this research we used the *verification experiment* to confirm or refuse the proposed assumptions by organizing, coordinating and conducting the experimental activity. The proposed experiment was of the constatative and ameliorative type.

The statistical-mathematical method

In the research, the data obtained from the trials/ tests were statistically processed using the following statistical indicators: the arithmetic mean of the group (x), the standard deviation or type deviation (S), the coefficient of variability (CV)which complements the determined statistical indices and indicates the homogeneity of the team."The high homogeneity of a group highlights the presence of the same sporting qualities, of the same athletic values (with small differences) in each of the analyzed cases." (Gagea, 1999, pp. 65). In analyzing and interpreting the results of experimental research, we used two types of "t" Test: the dependent T-test, used to highlight the differences between the tests following the application of the same independent variable on a single sample; the independent T - test applied to verify if the arithmetic means of the two samples (the experimental and control group) differ significantly.

The graphic method

This method allowed us to accurately view the data and we used it to highlight what is characteristic and essential in the evolution of the phenomena investigated.

The tests and measurement method

In order to determine the development of the coupling and the combination of movements, we used the following trial to check the segmental and plurisegmental motor coordination (Sima, 1984, pp. 7):

From standing with the feet close to each other:

T1 - the palms on the shoulders, step forward with the right foot;
T2 - stretch the arms up, step forward with the left foot;
T3 - bend the arms with the palms on the shoulders, step back with the right foot;
T4 - stretch arms laterally, step back with the left foot;
T5 - fold arms with palms on the shoulders with demi-plié;
T6 - stretch the arms up and stand on tiptoes;
T7 - fold the arms with the palms on the shoulders alternatively to the right and left;
T8 - lower the arms and return to the initial position;

Assessment: points from 1-10 the execution correctness, each mistake is penalized with 0,50 points.

The teacher explains and demonstrates only once the next exercise, and the subject is entitled to one attempt.

5. The Experiment Content

The research was carried out on a sample of 28 subjects (girls) aged 18 to 20, divided into two equal groups: the experimental and control group.

The design of the research followed these stages:

Stage I - initial testing of the investigated subjects;

Stage II - elaboration of the training program for the coordinative capacity focused on the segmental and plurisegmental coordination;

Stage III - application in the training lessons for the experimental group of the elaborated operational structures;

Stage IV - verification of the effectiveness of the operational structures developed by applying the intermediate testing to the experimental group.

Stage V - final testing of the two groups

The study was carried out between 17.10.2016 and 31.03.2017 in the aerobic gym of the U.P.B. During this period, the experimental group carried out one training program per week, in which 20 minutes / lesson (+5 minutes) were allocated for the development program of the segmental and plurisegmental coordination capacity, while the control group worked according to the traditional curriculum with the same number of lessons per week.

We further exemplify a sequence from the program of the experimental group:

Program no. 1 – segmental and plurisegmental coordination, motor memory
Operational Objectives
O1: Development of the coordinative components with emphasis on the segmental, plurisegmental and general body coordination;
O2: Developing the ability to combine in a varied way the motor actions with emphasis on perfecting the correct segmental placement on the upper and lower limbs;
O3: Improving the motor memory.

    Didactical Strategy
- materials: wall mirror;
- methods: demonstration, explanation, practice, conversation;
- assessment: trial of motor segmental and plurisegmental coordination.

Table 1. Program no. 1 - Segmental and plurisegmental coordination, motor memory

No	Operational Structures	Objectives	Work Forma-tions	Dosing	Methodical Indications
1.	I.P. Stand T1: hands on shoulders; T2: stretch the arms up; T3: fold arms with placing hands on shoulders; T4: stretch arm laterally T5: fold arms with placing hands on shoulders; T6: stretch arm laterally; T7: fold arms with placing hands on shoulders alternatively the right and left; T8: lower arms.	O1 O2 O3	- in circle	It is executed in series of 4 - 6 repetitions, X 2-4, p=10 sec.	It is executed at first from standing and then from moving forward /backward. We lay emphasis on the correct segmental placement. After learning the exercise, it will be executed as if in a contest. The student who made the fewest mistakes wins. The execution tempo will be progressively increased. The structure will be reproduced in reverse order.

6. Results

The dynamics of the results obtained during the experiment is shown in Tables no. 2, 3, 4 and refers to the value of the parameters determined through the assessment trial of the segmental and plurisegmental coordination (TMC) in the three tests (initial, intermediate and final) by comparing, at the group level, the determined statistical indicators:

Table 2. Comparative analysis of the results obtained in the assessment of the segmental and plurisegmental coordination Initial Testing T1 and Intermediate Testing T2

| No	Trial of motor segmental and plurisegmental coordination		STATISTICAL AND MATHEMATICAL INDICATORS						
			$\overline{X}/\pm\sigma$	$\overline{X}/\pm\sigma$	Progress	Cv		t	p
			T1	T2	T1-T2	T1	T2		
1.	T.M.C.	Pts.	6,85/±1,14	7,28/±1,04	0,43	16,63	14,37	2,91	<0,05

Table 3. Comparative analysis of the results obtained in the assessment of the segmental and plurisegmental coordination Intermediate Testing T2 and Final Testing T3

No	Trial of motor segmental and plurisegmental coordination		STATISTICAL AND MATHEMATICAL INDICATORS						
			$\overline{X}/\pm\sigma$	$\overline{X}/\pm\sigma$	Progress	Cv		t	p
			T2	T3	T2-T3	T2	T3		
1.	T.M.C.	Pts.	7,28/±1,4	8,3/±0,84	1,02	14,37	9,90	7,43	<0,001

Table 4. Comparative analysis of the results obtained in the assessment of the segmental and plurisegmental coordination Initial Testing T1 and Final Testing T3
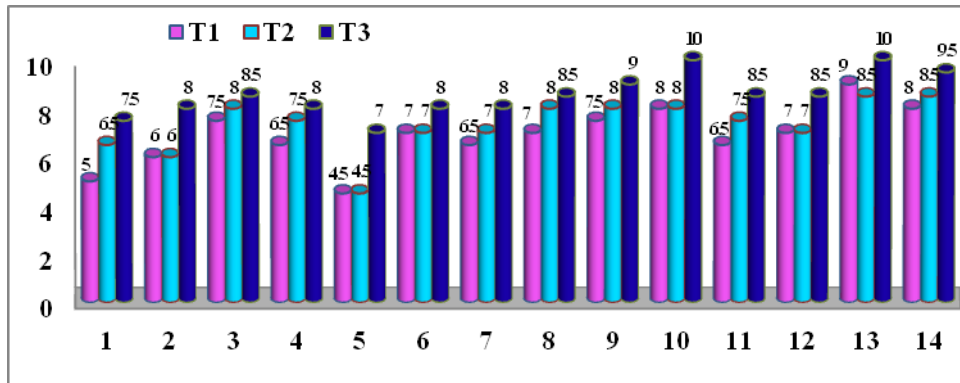
No	Trial of motor segmental and plurisegmental coordination		STATISTICAL AND MATHEMATICAL INDICATORS						
			$\overline{X}/\pm\sigma$	$\overline{X}/\pm\sigma$	Progress	Cv		t	p
			T1	T3	T1-T3	T1	T3		
1.	T.M.C.	Pts.	6,85/±1,14	8,3/±0,82	1,45	16,63	9,90	12,36	<0,001

We find that at the TMC (trial of motor segmental and plurisegmental coordination), the arithmetic mean „$\overline{X}$"is of 6.85pts. At the intermediate testing (T2) it is of 7.28 pts. and at the final one (T3) of 8.3 pts (Graph 1). The rate of progress between T1 - T2 is of 0.43 pts., between T2 - T3 it is of 1.02 pts, and between T1 - T3 it is of 1.45 pts. The spreading rate of the string values represented by the standard deviation "σ" has the initial testing value (T1) of 1.14, the intermediate testing value (T2) of 1.4, and the final test value (T3) of 0.82. The coefficient of variability "Cv" has the value of 16.63% at the initial testing (T1), of 14.37% at the intermediate testing (T2) and of 9.90% at the final testing (T3), so at the initial and intermediate testing the sample can be considered relatively homogeneous compared to the final testing where dispersion is low and the homogeneity is high. The value of the "Student" test calculated "t" between T1 - T2 is of 2.91 (resulting in a significant difference for p <0.05), between T2-T3 is of 7.43 and between T1-T3 "t" has the value of 12.36. So 7.43 and 12.36 > 4.22 (at the value of p < 0.001 in the Fischer Tab.) as a result of the differences in the testings are significant.
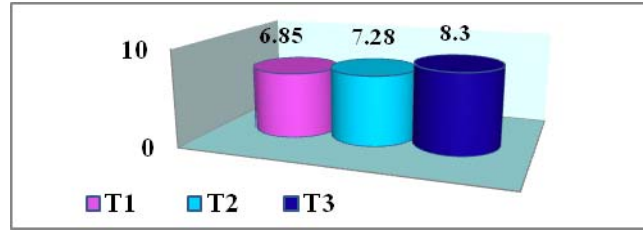
Graph 1. Dynamics of the experimental group at TMC (T1, T2, T3)

From graph 2 we observe that, in a proportion of 100%, the subjects progressed from one testing to another, two of the female students achieving the maximum score (10 pts) for this trial.

**Graph 2. Individual Dynamics at TMC (T1, T2, T3)**

The analysis of the results obtained by the two groups is shown in Table 5 and refers to the value of the parameters determined through the assessment trial of the segmental and plurisegmental coordination at the end of the experiment by comparing at the level of the two groups, the experimental and control group, the determined statistical indicators:

Table 5. Comparative analysis of the indices registered by the two groups (the experimental and control group) in the assessment of the segmental and plurisegmental coordination - final testing

No	Trial of motor segmentaland plurisegmental coordination		STATISTICAL AND MATHEMATICAL INDICATORS						
			$\overline{X}/\pm\sigma$	$\overline{X}/\pm\sigma$	Progress	Cv		t	p
			Experimental Gr.	Control Gr.		Exp. Gr.	Contrgr.		
1.	T.M.C.	Pts.	8,3/±0,82	7,41/±0,69	0,89	9,90	10,21	2,24	<0,05

At the TMC (Trial of motor segmental and plurisegmental coordination), the final results recorded by the experimental group ($\overline{X}$ = 8.3 pts.) were higher than those obtained by the control group ($\overline{X}$ = 7.41pts.) an aspect which can be observed in Graph no. 3, the progress rate of the experimental group compared to the control group being of 0.89 pts. The degree of spreading of the string values represented by the standard deviation "σ" is of 0.82 for the experimental group and of 0.69 for the control group. The coefficient of variability at the final testing has a value of 9.90% for the experimental group, which means a high homogeneity, and a value of 10.21% for the control group, which means a slightly moderate homogeneity. As a result of the "Student" test "t" we concluded that there are statistically **significant** differences between the values of the two groups (t = 2.24, so 2.24> 2.16 at the value of p <0.05 in the Fischer Tab.).
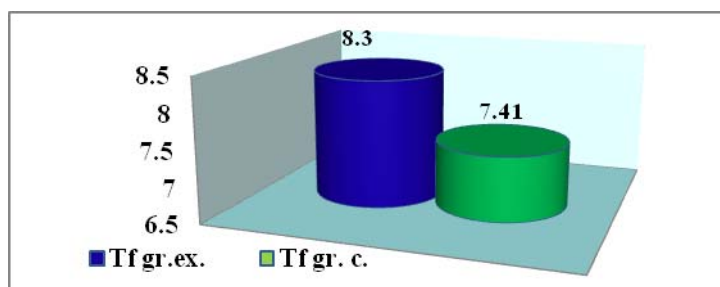
Graph 3. The representation of the averages obtained by the experimental group (ex. gr.) and the control group (c. gr.) at the final testing – TMC

7. Conclusions

The comparative analysis of the final results for the two groups, in the assessment of the motor segmental and plurisegmental coordination, reveals statistically significant differences, thus confirming the research hypotheses. These differences can be explained by the different effects of the training program for the two groups (the experimental and control group).

The rationalization and algorithmization of the operational structures within the applied programs proved their efficiency through the difference in the values of the results obtained by the experimental group following the application of the three testings (initial, intermediate and final).

Executing the technical content specific to aerobic dance at a high level requires a motor support predominantly of a coordinative nature, because the degree of development of the coordinative components intervenes in and supports the learning and improvement of the motor repertoire and also its application under various conditions.

The attestation of the results obtained by the experimental validation of the working hypotheses expresses the efficiency of the newly introduced paths in the organization, development and objectifications of the preparation performed, which leads to general formulations that are summed up to the theory sphere of the reference domain.

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