

NATIONAL UNIVERSITY OF PHYSICAL EDUCATION AND SPORTS

Bucharest, Romania, 2017

Abstract of the doctoral thesis:

OPTIMIZATION OF COORDINATION ABILITY IN CHILDREN WITH VISUAL IMPAIRMENTS USING THE MEANS OF RHYTHMIC GYMNASTICS

Scientific advisor: Prof. Mariana CORDUN, MD

PhD student: Oana-Cristiana IONESCU

Part I, **THEORETICAL APPROACHES TO THE ROLE OF MEANS SPECIFIC TO RHYTHMIC GYMNASTICS IN OPTIMIZING COORDINATION ABILITY OF VISUALLY IMPAIRED CHILDREN**, includes 5 chapters: **chapter 1** refers to the purpose and motivation for choosing the topic, **chapter 2** presents the reflection of the topic in literature, **chapter 3** highlights some issues on visual impairments, **chapter 4** treats about the means used in conducting rehabilitation programs, and **chapter 5** describes the psychomotricity at children with visual impairments. Part I ends with the presentation of theoretical conclusions.

Motivation for choosing the topic

The concern with introducing rhythmic gymnastics in the physical education lessons conducted in special schools is supported by two reasons: on the one hand, the *author's practical experience*, and on the other hand, the *formative and educational valences* of this sports discipline in educating the motricity components.

In the practice of rhythmic gymnastics, the most exerted motor component is coordination ability. Thus, by implementing a rehabilitation program based on exercises with hand apparatus, we aim to optimize some components of the coordination ability in visually impaired children.

Research purpose

The thesis aims to enrich the information base in the field of Sports and Physical Education Science, with a focus on special education, by investigating a specific category of subjects that emphasize objectively the pedagogical intervention methods able to develop and optimize coordination abilities through rhythmic gymnastics.

In the current context, we want to prove that this work is a novelty for the field of physical education and sports; in the literature reviewed so far, we have not found any association between the means specific to rhythmic gymnastics and visual impairments.

Research objectives

- to make visually impaired children learn some simple psychomotor actions for handling apparatus specific to rhythmic gymnastics;
- to reveal differences in improving some components of the coordination ability between children with amblyopia and those with visual blindness.

At the end of first part of the thesis, after reviewing the literature, there have been emphasized the following **conclusions**:

- The World Health Organization promotes policies and strategies for the social integration of individuals with various impairments, who enjoy special attention.
- Rhythmic gymnastics can be applied with both prophylactic and recovery purposes, being an excellent means to improve coordination in visually impaired subjects.
- Psychomotricity is characterized by the interaction between motor and mental components of the individual, being involved in the execution of voluntary movements.
- All components of psychomotricity (body schema, laterality, ideomotricity, motor intelligence and motor response organization) play a crucial role in performing motor activities.
- The concept of coordination ability is an essential psychomotor quality of the human being.

Part II, PRELIMINARY STUDY ON THE OPTIMIZATION OF COORDINATION ABILITY USING MEANS SPECIFIC TO RHYTHMIC GYMNASTICS IN CHILDREN WITH AMBLYOPIA, includes 4 chapters: **chapter 6** refers to the operational framework of preliminary study, **chapter 7** presents the research methods, **chapter 8** describes the rehabilitation program applied to the investigated subjects, and **chapter 9** presents, analyzes and interprets the obtained data. The second part of the thesis ends with the preliminary study conclusions.

Purpose of the preliminary study

The **purpose** is to diversify motor activities used in the physical education lesson for children with visual impairments (especially those with

amblyopia), by introducing some easy and attractive means that facilitate the process of improving coordination ability.

Objectives of the preliminary study

The **main objective** is *to improve some components of the coordination ability in children with amblyopia* using means specific to rhythmic gymnastics, namely the rope, hoop and ball.

Other objectives:

- to make children with amblyopia learn the psychomotor actions for handling apparatus;
- to develop their body schema using means specific to rhythmic gymnastics;
- to develop their intersegmental coordination;
- to develop their ability to work in ambidexterity conditions;
- to develop their ability to estimate the rotation directions of apparatus;
- to develop their ability to perform various movements in appropriate directions and planes.

Hypothesis of the preliminary study

By introducing the rhythmic gymnastics means in the physical education lesson for children with amblyopia, we can contribute to optimizing some components of the coordination ability (hand-eye coordination, static balance and spatial orientation).

Research subjects and location

Subjects included in the preliminary study were pupils from the *Special Middle School for Visually Impaired* of Bucharest (33, Austrului Street, sector 2), in the 3rd grade (A and B). They were *9 in number*, and the research group was made up based on criteria of inclusion and exclusion, respectively.

Assessment methods

To assess coordination ability, there were used the following tests: hand-eye coordination test, Romberg test, sensitized Romberg test, spatial orientation test.

Conducting the preliminary research

The research was conducted between **December 2014** and **April 2015**, as follows:

- in the month of **December**, there were achieved 6 observation protocols (3 for each classroom participating in the study);
- in the **first week of January**, it was performed the initial assessment of coordination level for children with amblyopia;

- in the period **from 13 January to 3 April**, it was applied the **therapy program** using means specific to rhythmic gymnastics, which included 22 lessons (1/week/classroom). Thus, for 3 months, the subjects worked alternately with the following hand apparatus: rope, hoop and ball. The therapeutic intervention was carried out in the fundamental part of the physical education lesson (20-30 minutes);
- in the **last week of April**, it was performed the final assessment of children with amblyopia.

Conclusions of the preliminary study

- The participating subjects have recorded progress in their coordination ability. The positive development of children with amblyopia, as a result of applying the rhythmic gymnastics means, is proven by the **confirmation of the study hypothesis**.
- The analysis and interpretation of results show the efficiency of means specific to rhythmic gymnastics; the purpose proposed by us has been reached, since the coordination ability of children with amblyopia has improved significantly.
- The investigated subjects got actively involved in the development of the study, which was demonstrated by their constant participation in the physical education lessons, during which they have learned to handle 3 apparatus: rope, hoop and ball.
- Requiring the pupils to perform some exercises created difficulties, but their perseverance has helped them learn to handle the 3 apparatus.
- The study subjects expressed verbally their desire to continue and perform constantly this activity, appreciating the formative and educational valences of the rhythmic gymnastics means.
- Exercises with hand apparatus have increased attractiveness of the lesson, which is suggested by the pupils' active and constant participation and their desire to quickly learn the demonstrated actions.

Part III, **CONTRIBUTIONS TO THE OPTIMIZATION OF COORDINATION ABILITY USING THE MEANS OF RHYTHMIC GYMNASTICS IN CHILDREN WITH VISUAL IMPAIRMENTS**, includes 5 chapters: **chapter 10** refers to the operational framework of the research, **chapter 11** presents the research methods, **chapter 12** describes the rehabilitation program applied to the investigated subjects, **chapter 13** presents, analyzes and interprets the obtained data, and **chapter 14** highlights the conclusions. In the third part of the thesis, there are emphasized the following issues: elements of originality, result dissemination, bibliography and appendices.

Research purpose

It consists in examining the effect of rhythmic gymnastics means on the motor background of visually impaired children.

Research objectives

a) General objectives:

- educating coordination ability in children with visual impairments;
- children's understanding and learning of the proposed therapeutic means through motor actions performed with apparatus specific to rhythmic gymnastics;
- preventing postural defects in the research subjects through apparatus handling actions;
- substituting visual impairment with the help of other valid analyzers in order to achieve the proposed activity;
- developing intragroup relationships for visually impaired children through the playful activity performed with hand apparatus, which is represented by collaboration actions.

b) Specific objectives:

- developing the psychomotricity components:
 - balance;
 - intersegmental coordination;
 - spatial-temporal orientation;
 - kinesthetic differentiation.

Research hypotheses

1. The means of rhythmic gymnastics, represented by exercises with hand apparatus, contribute to optimizing some components of the coordination ability (hand-eye coordination, balance, spatial orientation, kinesthetic differentiation, intersegmental coordination) in visually impaired children.

2. Implementing the rhythmic gymnastics means in the rehabilitation programs improves the subjects' perception of this sports discipline.

Research subjects and location

The research was conducted at the *Special Middle School for Visually Impaired* of Bucharest (33, Austrului Street, sector 2). There were randomly made up two groups totaling 24 pupils in the lower secondary cycle of the special education unit. We mention that the number of pupils in the classrooms is low (about 8 to 10).

The 24 subjects included in the research were both girls and boys with visual impairments, of which 12 diagnosed with amblyopia and 12 diagnosed with visual blindness.

Assessment methods

To assess coordination ability, there were used the following tests and trials: hand-eye coordination test, Romberg test, sensitized Romberg test, spatial-temporal orientation test, kinesthetic differentiation test, stepping through six hoops, walking on the gymnastics bench, lateral travel on the gymnastics bench. All these were adjusted to the needs of visually impaired children.

Conducting the research

The research took place between **October 2015** and **June 2016**, because each grade in the lower secondary cycle has 2 physical education classes per week, according to the school curriculum. Thus, the work program consisted in *achieving one lesson/week with each classroom participating in the research.*

During the lessons conducted at the *Special Middle School for Visually Impaired*, the activity was divided as follows:

- in the month of **October**, it was achieved the initial assessment of coordination ability for children with visual impairments;
- **from November to April**, it was carried out the program of physical exercises with hand apparatus, and the total number of lessons was *19 sessions/classroom*; each session lasted 50 minutes, the equivalent of one hour of physical education;
- in the month of **May**, the tests and trials designed to assess coordination ability were applied again to check whether changes have occurred in the coordination of children with amblyopia and visual blindness, as compared to the initial assessment;
- in the month of **June**, it was achieved the assessment of static balance using the *stabilometric platform*. To perform measurements, we enjoyed the support of the Interdisciplinary Research Center “Dr. Alexandru Partheniu”, within the UNEFS Bucharest, directed by Prof. Țifrea Corina, PhD. Concomitantly with the assessment of static balance, it was applied an opinion questionnaire to highlight the subjects’ perception of the program based on the rhythmic gymnastics means. We underline that, in this approach, we cooperated with the teaching staff from the *Laboratory of psychology and psychomotor research* within the UNEFS Bucharest, especially with Associate Prof. Mitrache Georgeta, PhD. Applying the questionnaire at the end of research is justified by the

fact that, before conducting it, children with visual impairments knew nothing about the apparatus specific to rhythmic gymnastics, therefore they were not able to express any opinion on their use.

Research conclusions

1. From the analysis and interpretation of **calculated scores**, it is found that the subjects included in **group A** have recorded progress for most components of the coordination ability (hand-eye coordination, static and dynamic balance, kinesthetic differentiation and intersegmental coordination) after applying the therapy program. Differences between the initial and final testing are statistically significant, which is proven by the Wilcoxon test at $p < 0.05$, applied in the analysis of scores awarded (for hand-eye coordination $p = 0.005$, for static balance assessed using the Romberg test with visual control $p = 0.002$, the Romberg test without visual control $p = 0.003$, the sensitized Romberg test with visual control $p = 0.004$ and the sensitized Romberg test without visual control $p = 0.006$, for spatial-temporal orientation $p = 0.004$, for kinesthetic differentiation $p = 0.004$, for movement and balance coordination $p = 0.002$, for dynamic balance assessed using walking on the gymnastics bench $p = 0.008$ and lateral travel on the gymnastics bench $p = 0.002$).
2. As regards the **other parameters analyzed** (time for completing the hand-eye test, total deviations and steps in the Romberg and sensitized Romberg tests, the number of boxes correctly arranged in the kinesthetic differentiation test, time for completing the stepping through six hoops, as well as walking and lateral travel on the gymnastics bench), for the same subjects included in **group A**, it is noted that most of them have improved after the learning and execution of psychomotor actions with hand apparatus. Data are statistically significant, which is proven by the group's improvement in the median score, standard deviation and Wilcoxon test (at $p < 0.05$).
3. In **group B**, it is found that the **scores awarded** for most components of the coordination ability (static and dynamic balance, kinesthetic differentiation, intersegmental coordination) have increased in the final assessment compared to the initial one after applying the means specific to rhythmic gymnastics, which is highlighted by the Wilcoxon test ($p < 0.05$), but less in the case of hand-eye coordination ($p = 0.063$).
4. As regards the **other parameters analyzed** for the subjects included in **group B**, it is noted that most of them have improved between the initial and final assessments. Results are statistically supported by the Wilcoxon test (time for completing the hand-eye coordination test $p =$

0.020, the number of boxes correctly arranged in the kinesthetic differentiation test $p = 0.003$).

5. Concerning the **spatial-temporal orientation**, it is found that both the subjects included in **group A** and **group B** have recorded a decrease in the number of steps performed and an increase in the quality of execution, which is supported by the improvement of calculated scores.
6. After **comparing the intragroup results**, it is found that some coordination components (hand-eye coordination, dynamic balance, spatial-temporal coordination and intersegmental coordination) are positively influenced by the psychomotor actions for handling apparatus. Statistical processing reveals that the obtained data are significant, and the significance threshold value in the Mann-Whitney test does not exceed 0.05 ($p < 0.05$).
7. After **comparing the intergroup results**, it is found that certain components do not show significant differences in the scores achieved by visually impaired children, which is revealed by static balance and kinesthetic sensitivity. In the Mann-Whitney test, the significance threshold value exceeds $p < 0.05$ for the Romberg and sensitized Romberg tests with or without sensory control, namely with the eyes open or closed. This is also noted in the kinesthetic differentiation test, where the significance threshold value is $p = 0.070 > 0.05$ for $z = -1.813$.
8. As regards the **assessment of static balance** using the **stabilometric platform** for the monitored parameters, the **intergroup results** were analyzed with the help of Mann-Whitney test. Thus, it has been proven that they are inhomogeneous (for the eyes open - oscillations in the frontal plane $p = 0.908$, oscillations in the sagittal plane $p = 0.644$).

*Conclusions 1, 2, 4 and 6 confirm **hypothesis 1** of the research for the hand-eye coordination, static and dynamic balance, kinesthetic differentiation, intersegmental coordination and partially for the spatial-temporal orientation. It states that: the means of rhythmic gymnastics, represented by exercises with hand apparatus, contribute to optimizing some components of the coordination ability (hand-eye coordination, balance, spatial orientation, kinesthetic differentiation, intersegmental coordination) in visually impaired children.*

9. After applying the **opinion questionnaire**, it has been found that the apparatus used in the physical education lesson were easy to handle by the investigated children, except for the ball whose handling created difficulties to the subjects in group B. The assertion is supported by statistical results: the Mann-Whitney test, where the score achieved was $p = 0.043 < 0.05$, for $\chi^2 = 8.143$.

Conclusion 9 confirms hypothesis 2 of the research, according to which: implementing the rhythmic gymnastics means in the rehabilitation programs improves the subjects' perception of this sports discipline.

10. The purpose and objectives proposed in the research have been fulfilled. Initial testing established the motor level of visually impaired children before applying the therapy program based on means specific to rhythmic gymnastics. Final testing, which was performed after the learning of psychomotor actions for handling apparatus, allowed us to assess the dynamics of the coordination ability components.
11. Data analysis and interpretation proves that, in people with visual impairments, certain components of the coordination ability (hand-eye coordination, balance, spatial-temporal orientation, kinesthetic differentiation, intersegmental coordination) are influenced by the application of some means involving low handling difficulty.
12. Results recorded by visually impaired children in the Romberg and sensitized Romberg tests could not be correlated with those obtained with the help of digital devices (stabilometric platform), because the inhomogeneity of data made impossible their statistical processing.
13. Assessment of static balance using the stabilometric platform confirms the results recorded in the final clinical assessment of children with amblyopia and visual blindness, respectively.
14. Application of the opinion questionnaire indicates that the opinions of the two groups are similar for most questions.
15. We can state that rhythmic gymnastics contributes significantly to the optimization of coordination ability in children with amblyopia and visual blindness.