ACROSS
www.across-journal.com
ISSN 2602-1463
Vol. 8 (2) 2024 Teaching, Multiculturalism, and Quality of Life



# The Contribution of Physical Education in the Correction of Primary School Students' Dysgraphia

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**Abstract**
The actuality of the discussed subject is determined by the valorization of physical education activities in the didactic process to correct primary school students' dysgraphia. At present, physical development is little exploited in this sense. Physical education classes are limited and as a result the number of students with learning disorders, especially with dysgraphia, increases significantly. From this point of view, we note the need to capitalize on physical education, as a component of the instructional-educational process in the school which aims to contribute to the improvement of the physical and intellectual development; of the students' motor capacity. The physical education process in primary school does not have a program for correcting dysgraphia and the number of hours for the physical education classes is limited, a fact that aggravates both writing disorders and the development of the student's personality.

*The purpose of the research* is the elaboration and implementation of the Pedagogical Model of the influence of the specific means of physical education on the correction of dysgraphia in primary school students.

**Keywords:** physical education, graphical disorder, methods, program, exercises, experimental project

## INTRODUCTION

The subject of this article concerns the influence that physical exercises have on the level of psychomotor development and the correction of dysgraphic disorders in primary school students. The basis of the research approach was the increased number of dysgraphic disorders in the primary cycle. Dysgraphia is a disorder of learning the written language with negative reflections on the personality formation of primary school students that also manifests itself in the later stages: gymnasium and high school.

The concerns of physical education, in the correction of various learning disorders, are at the centre of attention at various stages of the training process. In this context, we mention the research carried out by Vrăjmaș E. [8], V. Rusnac [5], Bucun N., Burlea [2], G. Burlea [3], Carp I. [7], which addresses the problem of the peculiarities of the psychomotor development of primary school students in the correction of learning disorders, including dysgraphia. These studies reveal that the specific means of physical education contribute to the coordination of the activity of the motor centres of the sensory receptors, the formation of motor representations and the harmonization of the process of excitation and inhibition of the nervous system, necessary in the formation of graphic images.

The current situation of dysgraphia in primary education is due to the neglect and underutilization of physical education activities in school that would have benefits in preventing and correcting various dysgraphic disorders.

It is worth noting that various means of physical education exert a specific influence on general physical development and psychomotricity, a fact that can contribute to learning the writing process because they require the synergy of both linguistic and motor factors [9].

In this context, the solution to the problem resides in perfecting and improving the system and content units of physical education activities aimed at correcting dysgraphia. This can only

be achieved by having a system of instructional-educational sessions staggered on objectively established stages for both primary school and physical education teachers.

*The purpose of the research* consists in the elaboration of the Pedagogical Model on the influence of the specific means of physical education on the correction of dysgraphia in primary school students.

*Research objectives*: the analysis of the epistemological benchmarks regarding the influence of the specific means of physical education on the correction of dysgraphia in primary school students, the establishment of the effect relationships between the specific means of physical education and those characteristic of the writing activity; the elucidation of the mechanisms in the field of physical education involved in the formation of writing skills; experimental argumentation of the effectiveness of the Pedagogical Model of influence of the specific means of physical education on the correction of dysgraphia in primary school students.

## METHODOLOGY

The epistemological landmarks are represented by principles, theories, concepts and ideas in the fields of pedagogy, theory and methodology of physical education, age psychology, special psychopedagogy, and speech therapy.

*At the level of theoretical conceptualization:* the method of analysis and synthesis, the method of theoretical generalization, interpretation and conclusion.

*At the praxeological level* – observation, tests to determine the level of physical and psychomotor development; and statistical-mathematical methods for data processing and interpretation.

**The important scientific problem solved** resides in the theoretical-methodological substantiation of the pedagogical benchmarks of influence of the specific means of physical education on the correction of dysgraphia in primary school students, a fact that determined the conceptualization and elaboration of a Pedagogical Model of influence of the means of physical education on the correction of dysgraphia of students from primary school.

The writing process is a complex activity that requires visual, sensory-motor, spatial-temporal organization and structuring mechanisms, motor processes (the neuromuscular response of synergies), integrative processes at the higher cortical level, for which reason in the acquisition and correction of the writing process the development of cognitive and motor processes is required.

In the context of the above, the Pedagogical Model of the influence of physical education tools on the correction of dysgraphia of primary school students ($2^{nd}$ grade) was structured according to the following scenario: formulation of objectives; the dysgraphia correction algorithm in the extracurricular activity of physical education; the total number of lessons per week, month, year; the calendar plan at the initial, basic, final level of training dysgraphia correction skills; the model project of the learning unit that we present; the content-model of the special physical exercises and the method of application.

The study period, with a total number of 108 hours per year of the model, includes three levels that provide a set of physical exercises for the development of the components: psychomotor, general motor, the fine muscles of the hand contributing to the improvement of functionality, kinesthetic integrity, visual movements - kinesthetic, visuospatial, of movements in dynamics:

I. Early-level dysgraphia correction oriented towards general physical fitness.

ISSN 2602-1463
Vol. 8 (2) 2024 Teaching, Multiculturalism, and Quality of Life



This level aims to improve the motor capacity, as it influences the free manifestation in the graphic movement.

II. The basic intermediate level in the correction of dysgraphia is oriented towards the development of psychomotor peculiarities. The development of psychomotor characteristics is essential in the correction of dysgraphia, explained by the fact that it restores the ability to get one's bearings on a sheet of paper, to coordinate with the movements involved in the graphic act, and to have the reactions of the movements.

III. The level of improvement and graphic adaptation oriented towards the development of fine muscles.

The development of fine motor skills of the hand contributes to the correction of motor dysgraphia.

The curriculum for the distribution of hours within the Model is developed following the types of training (stages) and training semesters, having a total number of 108 hours.

***Table 1. The distribution of hours of the experimental model for second-grade students in the extracurricular activity of correcting dysgraphia***

| Nr. of crt. | The methodical-didactic system | The initial level of dysgraphia correction | Basic intermediate level | The level of refinement and graphic adaptation | Assessment | Total hours |
|---|---|---|---|---|---|---|
| 1. | General physical training | 32 | - | - | 2 | 34 |
| 2. | Specialized psychomotricity training | - | 50 | - | 2 | 52 |
| 3. | Development of local motor skills of the fine muscles | - | - | 20 | 2 | 22 |
| | Total hours | 32 | 50 | 20 | 6 | 108 |
| | % | 29.13% | 46,30% | 18.52% | 5,56% | 100% |

The demonstrative figure of the Pedagogical Model of influence of the specific means of physical education on the correction of dysgraphia (Fig 1.).

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www.across-journal.com
ISSN 2602-1463
Vol. 8 (2) 2024 Teaching, Multiculturalism, and Quality of Life



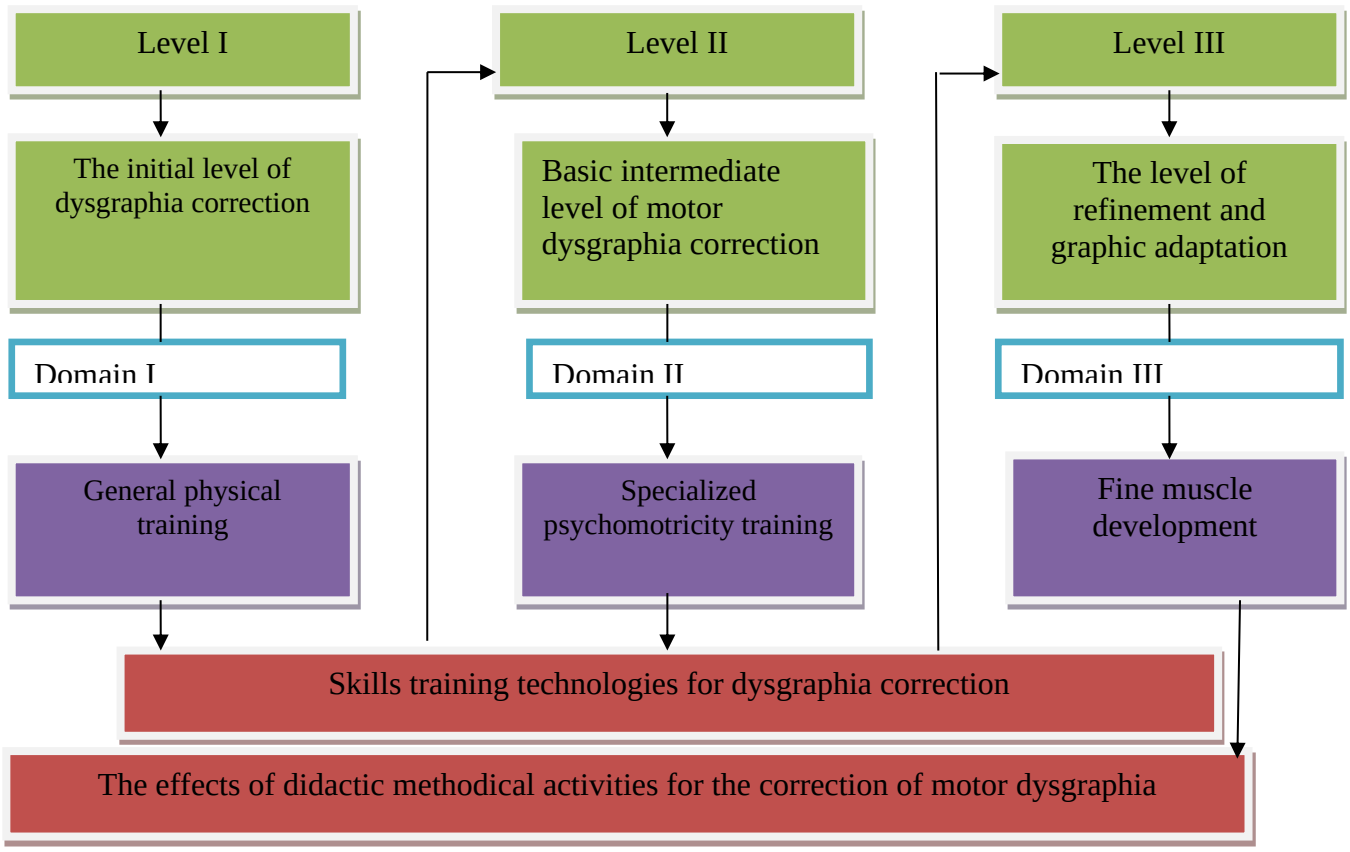


*Fig. 1. The pedagogical model of the influence of physical education on the correction of dysgraphia of primary school students (2nd grade)*

The pedagogical model of the influence of the means of physical education on the correction of dysgraphia, for primary school students, was developed per the methodical indications specific to primary grades and taking into account the particularities of age: taking into account the elimination of factors causing anxiety states; the dynamics of effort during the lesson; avoiding long-lasting intense efforts or positions maintained for a long time; short, clear and accessible explanation or demonstration; the use of techniques and procedures for improving the strength and speed indices addressed to the segments of the upper limbs; the use of specific means of rolling different portable objects (balls, sticks); rhythmicization techniques and procedures will be used.

**RESULTS**

In order to study the psychomotor, physical condition and the handwriting of the students of the experimental groups, as well as the effectiveness of the Pedagogical Model of influence of the specific means of physical education on the correction of dysgraphia, the pedagogical training experiment was organized and carried out during one study year.

As seen from Table 2, the comparative analysis of the results of the control group of students in the dynamics of the academic year demonstrates that all the statistical averages of the same indices changed for the better at the end of the experiment. But this improvement has

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ISSN 2602-1463
Vol. 8 (2) 2024 Teaching, Multiculturalism, and Quality of Life



an untrue character of development at the end of the experiment at P>0.05. An exception is the results of the "Rope Jumping" test (P<0.05), which, in our opinion, for this age of the students in the control group, has an emotionally attractive, stimulating character.

***Table 2.Comparative analysis of the initial and final indices of the level of physical development of the boys within the pedagogical experiment (n1=15; n2=15)***

| | Tests | Groups and statistics | Initial indicators $\bar{X}$ ± m | Final indicators $\bar{X}$ ± m | Statistics | |
|---|---|---|---|---|---|---|
| | | | | | t | P |
| Physical condition | | | | | | |
| 1 | Shuttle run 3x10m (sec) | E | 10.13±0.44 | 8.77±0.40 | 3.40 | <0.01 |
| | | M | 10.50 ± 0.43 | 10.00±0.45 | 1.19 | >0.05 |
| | | t | 0.61 | 2.05 | — | – |
| | | P | >0.05 | <0.05 | — | – |
| 2 | Long jump from standing (cm) | E | 119.56±4.86 | 137.05±4.44 | 3.96 | <0.01 |
| | | M | 120.12 ± 4.91 | 123.05±4.90 | 0.63 | >0.05 |
| | | t | 0.08 | 2.10 | — | – |
| | | P | >0.05 | <0.05 | — | – |
| 3 | The strength of the dominant hand | E | 42.82 | 78.82 | Δ≈ 36.00 | |
| | | M | 43.00 | 60.12 | Δ=17.12 | |
| 4 | Jump rope 30 sec (nr. of times) | E | 36.10±1.80 | 43.41±1.77 | 4.32 | <0.001 |
| | | M | 34.41 ±1.84 | 38.13±1.82 | 2.15 | <0.05 |
| | | t | 0.66 | 2.08 | — | – |
| | | P | >0.05 | <0.05 | — | – |
| 5 | Hanging on a bar (sec) | E | 34.02±1.54 | 39.16±1.46 | 3.83 | <0.01 |
| | | M | 34.64±1.48 | 3.,51±1.47 | 0.81 | >0.05 |
| | | t | 0.19 | 2.12 | — | – |
| | | P | >0.05 | <0.05 | — | – |
| | | M | 5.47 ± 0.28 | 5.95±0.30 | 1.78 | >0.05 |
| 6 | Ozeretskii test (sec) | E | 25.12±0.80 | 27.49±0.70 | 3.34 | <0.01 |
| | | M | 24.36±0.76 | 25.19±0.75 | 1.17 | >0.05 |
| | | t | 0.69 | 2.25 | — | – |
| | | P | >0.05 | <0.05 | — | – |

The final data confirm that, in the dynamics of the experiment, in comparison with the initial results, they improved considerably P<0.01-0.001. At the same time, the indices of the tests that characterize the speed of movements and coordination (Shuttle running) improved significantly.

Table 3 shows the results of psychomotor testing for students with motor dysgraphia, which include the experimental and control groups. Overall, the psychomotor development of the students of the control group, in our opinion, also reflects motor activism but is reduced to traditional physical education lessons. At the same time, by studying the data obtained from the psychomotor tests of the students of the experimental group (Table 3), we can confirm that

ACROSS
www.across-journal.com
ISSN 2602-1463
Vol. 8 (2) 2024 Teaching, Multiculturalism, and Quality of Life



at the end of the experiment, the totalizing data compared to the initial data improved considerably. (P<0.01-0.001).

***Table 3.Comparative analysis of the initial and final indices of the level of psychomotor development of boys within the pedagogical experiment (n1=15; n2=15)***

| | **Tests** | **Groups and statistics** | **Initial indicators** $\overline{X}$ **± m** | **Final indicators** $\overline{X}$ **± m** | **Statistics** | |
|---|---|---|---|---|---|---|
| | | | | | **t** | **P** |
| **Psychomotor status** | | | | | | |
| 1 | Motor reaction to sound (ms) | E | 0.36±0.03 | 0.24±0.02 | 4.40 | <0.001 |
| | | M | 0.39±0.03 | 0.34±0.03 | 1.67 | >0.05 |
| | | t | 0.75 | 2.25 | — | — |
| | | P | >0.05 | <0.05 | — | — |
| 2 | Motor reaction to light (ms) | E | 0.35±0.03 | 0,23±0,02 | 4,80 | <0,001 |
| | | M | 0.36±0.03 | 0.33±0.03 | 1.33 | >0.05 |
| | | t | 0,25 | 2,25 | — | — |
| | | P | >0,05 | <0,05 | — | — |
| 3 | ROM (ms) | E | 10.18±0.31 | 9.07±0.27 | 3.61 | <0.01 |
| | | M | 10.43±0.32 | 9.91±0.30 | 1.79 | >0.05 |
| | | t | 0.57 | 2.10 | — | — |
| | | P | >0.05 | <0.05 | — | — |
| 3.1 | Number of reactions on time | E | 7 | 79 | Δ + 72 | |
| | | M | 8 | 13 | Δ + 5 | |
| 3.2 | The number of reactions ahead of time (%) | E | 28 | 12 | Δ –16 | |
| | | M | 26 | 24 | Δ –2 | |
| 3.3 | The number of delayed | E | 65 | 9 | Δ –56 | |
| | | M | 66 | 63 | Δ –3 | |
| 4 | “Tapping” test 40 sec (iterations) | E | 170.85±7.18 | 203,17±6,94 | 4.84 | <0.001 |
| | | M | 172.30±7.13 | 181,18±7,00 | 1.33 | >0.05 |
| | | t | 0.14 | 2.23 | — | — |
| | | P | >0.05 | <0.05 | — | — |
| 4.1 | Decrease the number of touches from 1 to | E | 42 | 28 | Δ –14 | |
| | | M | 41 | 32 | Δ –9 | |

Summing up the psychomotor training of the students of the experimental group, the results of the experimental group in all tests are significantly higher (P<0.001) compared to the

ACROSS
www.across-journal.com
ISSN 2602-1463
Vol. 8 (2) 2024 Teaching, Multiculturalism, and Quality of Life



control group of students both dynamically and between groups. We can confirm that, due to the application of the proposed Model in the experimental group, not only positive and significant psychomotor development was achieved.

At the beginning and the end of the pedagogical experiment, control dictation was carried out in the experimental groups, which according to the results would confirm our hypothesis about the influence of special means of physical education in the correction of dysgraphia.

Examining the indices of graphic errors in the students of the experimental group, it should be noted that at the end of the experiment, they decreased considerably, both in relation to the initial data and the control group. Thus, for all the graphic criteria in the students of the experimental group, the number of errors decreased from 8 to 30% and the average index of this index is 22.83% in relation to their own errors at the beginning of the experiment. At the same time, the writing graphics in the control dictation at the final stage improved by 19.83% (by 7.61 times) compared to the control group (Table 4).

***Table 4. The average indices of the comparative analysis of the graphic errors committed by the students of the experimental groups in the control dictation during the research period***
***(n1 -15; n2 - 15)***

| Nr of crt | Groups | | Statistical characteristics of graphic errors in control dictation $\overline{X}$ ± m | | t | P |
|---|---|---|---|---|---|---|
| | | | Initial (before the experiment) | Final (after the experiment) | | |
| 1 | Control (M) | | 35,66±5,00 | 32,66±5,43 | 1,15 | >0,05 |
| 2 | Experimental (E) | | 36,00±4,84 | 13,17±1,29 | 6,07 | <0,01 |
| | | t | 0,05 | 3,49 | — | — |
| | | P | >0,05 | <0,01 | — | — |

As can be seen from Table 4, at the beginning of the experiment according to the statistical indices of graphic errors committed in dictation of the control group, no significant differences are observed between the experimental groups (t=0,05 la P>0,05).

In the control group, the final results compared to the initial ones did not change significantly and have a comparatively insignificant character (t=1,15, P>0,05), but in the experimental group of students, their totalization errors compared to the initial ones changed significantly (t=6,07; P<0,01). Moreover, as Table 4 confirms, at the end of the experiment the experimental group of students also has a significant predominance over the control group, in terms of the considerable decrease of their own graphic errors in the control dictation (t=3,49, at P<0,01).

The improvement of the writing process highlighted in the research, confirms the effectiveness of the proposed Model, through general physical development (special preparation of motor skills for the subsequent long activity with a correction character); psychomotricity (mastering the coordination of one's own movements and gestures, the formation of ideomotor representations, the perception of one's own movement in time and

space, etc.) and fine motor skills (training the precision of fine movement, the correct execution of hand movements, the development of the fine musculature of the hand, etc.).

## CONCLUSIONS

Based on the investigative results, we can formulate the following general conclusions:

1. At present, a negative aspect of primary classes is the consequences of dysgraphia, which greatly influences the success of students and the formation of their personality. Most of the authors emphasize the significant gaps in the professional and managerial methodology for correcting these disorders. At the same time, the knowledge of removing dysgraphia in the practice of correction is insufficient; it requires a multidisciplinary approach to the components of physical development in the correction of dysgraphia. These analyzes highlighted the need to develop a Pedagogical Model of the influence of specific physical means on the correction of dysgraphia in primary school students.
2. Researching motor and psychomotor development, the results of the experimental group according to the studied tests are significantly higher compared to the control groups, both dynamically and between groups ($P<0.05$-$0.01$). The psychomotor development of the students of the experimental groups demonstrates that during the studied period all of them improved their results in all the applied tests.
3. The orientation of the proposed Model in the correction of dysgraphia in the experimental group significantly influenced the improvement of their handwriting. The results of the written works carried out in the experimental group confirm a significant ($t=6.07$, at $P<0.01$) decrease in dysgraphia as a result of the application of the Pedagogical Model of the influence of the specific means of physical education on the correction of dysgraphia in extracurricular physical activities.

As a result of the research carried out, we can formulate the following recommendations:

1. Both curricular and extracurricular physical education activities for primary school students must contain a specialized direction for correcting various learning disorders, based on the psychological peculiarities of development in the 1st-4th grades.
2. All physical education activities for primary school students must be 3 hours per week, and due to the presence of age-appropriate conditions, we propose extracurricular activities with positive emotional content and the stimulation of motor activism.
3. All physical education activities for primary school students must be carried out by the physical education specialist with pedagogical internship and work experience.

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