TEME, г. XLV, бр. 1, јануар – март 2021, стр. 73–93

Оригинални научни рад https://doi.org/10.22190/TEME200220047D
Примљено: 20. 2. 2020. UDK 376-053.2:159.946.4
Ревидирана верзија: 5. 5. 2020.
Одобрено за штампу: 26. 2. 2021.

WRITING IN CHILDREN WITH DISABILITIES

Lucija Djordjević[1], Srboljub Djordjević[2]*, Ljiljana Mitić[2]

[1]Elementary school for special education "Vule Anti"' Vranje, Serbia
[2]University of Niš, Pedagogical Faculty, Vranje, Serbia

Abstract

The paper presents the results of a study aimed at examining the ability and level of writing proficiency in students with disabilities at primary school age. The sample consisted of 58 students with disabilities of primary school age. Dysgraphic Prediction Test and Lilien Lirs graphomotor array were used to assess visual perception and graphomotor skills, while the handwriting was evaluated by the Scale for Assessment of Dysgraphic Forms in handwriting. The obtained results show that a large number of subjects (24 or 41,4%) did not score a single point on Dysgraphic Prediction Test, while only 21 subjects (36,2%) successfully completed the test (M = 7,98, SD = 7,062). Also, the obtained results show that the highest number of respondents (39 or 67,2%) did not score a single point on the Lilian Lirs test, while only 10 respondents or 17,2% successfully completed the test (M = 1,60, SD = 2,46). Using the Scale for the Assessment of Dysgraphic Forms in handwriting, we found that out of 22 written samples, 9 students (41%) have a well-developed handwriting, 8 (36%) have an ugly handwriting, 3 (14%) respondents have dysgraphic handwriting, while 2 (9%) respondents have a pronounced dysgraphic handwriting. Out of the total number of respondents, 36 (62%) of the sample students could not write the appropriate text on the basis of which the sample of the handwriting was taken. The obtained results provide the exact knowledge of the presence of difficulties in adopting writing by students with disabilities.

Teaching students with disabilities, according to the results obtained, imperatively imposes the need to respect the developmental characteristics of this population of students and the individualization of the initial teaching of writing. This involves major changes to the standards and outcomes of achievements required by the regular curriculum and the development of an IOP for each student with more complex individualized contents to support the child in order to adopt writing. However, effective work with this student population also entails the need to adopt special curricula intended for teaching in schools for students with disabilities.

Key words: writing, dysgraphia, students with disabilities, primary school.

* Аутор за кореспонденцију: Србољуб Ђорђевић, Педагошки факултет у Врању, Партизанска 14, 17500 Врање, Србија, dr.djordjevic@yahoo.co.uk

ПИСАЊЕ КОД ДЕЦЕ СА СМЕТЊАМА У РАЗВОЈУ

Апстракт

У раду су приказани резултати истраживања које је имало за циљ да испита могућност и ниво усвојености писања код ученика основношколског узраста са сметњама у развоју. Узорак истраживања је чинило 58 ученика основношколског узраста са сметњама у развоју. За процену визуелне перцепције и графомоторних способности коришћени су Предикциони тест за дисграфију и графомоторни низ Лилијен Лирс, док је рукопис процењен Скалом за процену дисграфичних форми у рукопису. Добијени резултати показују да велики број испитаника (24 или 41,4%) није остварио ниједан поен на Предикционом тесту за дисграфију, док је само 21 испитаник (36,2%) успешно решио тест (M = 7,98, SD = 7,062). Такође, добијени резултати показују да највећи број испитаника (39 или 67,2%) није остварио ниједан поен на тесту Лилијен Лирс, док је само 10 испитаника или 17,2% успешно решило тест (M = 1,60, SD = 2,46). Применом Скале за процену дисграфичних форми у рукопису утврдили смо да од 22 узорка рукописа код 9 ученика (41%) постоји складно развијен рукопис, 8 (36%) има ружан рукопис, дисграфичан рукопис има 3 (14%) испитаника, док 2 (9%) испитаника има изражено дисграфичан рукопис. Од укупног броја испитаника, 36 (62%) ученика нису могли да напишу одговарајући текст на основу кога се узима узорак рукописа. Добијени резултати пружају егзактна сазнања о присуству тешкоћа у усвајању писања од стране ученика са сметњама у развоју.

Наставни рад са ученицима са сметњама у развоју, сходно добијеним резултатима, императивно намеће потребу поштовања развојних карактеристика ове популације ученика и индивидуализацију почетне наставе писања. То подразумева знатне измене стандарда и исхода постигнућа који се захтевају по редовном наставном плану и програму и израду ИОП-а за сваког ученика са комплекснијим индивидуализованим садржајима подршке која се пружа детету у циљу усвајања писања. Међутим, ефикасан рад са овом популацијом ученика подразумева и потребу доношења и посебних наставних планова и програма намењених школама за ученике са сметњама у развоју.

Кључне речи: писање, дисграфија, ученици са сметњама у развоју, основна школа.

INTRODUCTION

Writing is, in its essence, a visual record of communicating a message through the transformation of language into an appropriate symbolic-grapheme system. The basis of writing is contained in the language itself when it comes to the content of a written message. In this way, one form of language is manifested, and that is its visual component. What is the most elementary in the language, which is the *phoneme*, in writing is the *letter* or *grapheme*. While the language is assisted by speech organs to express itself, expressing writing is assisted by a hand with the system of certain graphomotor movements – the control over hand movements while writing is conditioned by a visual analyzer that stores the visual memory of graphemes, as well as all that constitutes spatial orientation when writing. Based on the above, it can be concluded that the expression of writing is based on the integration of the *linguistic, visual* and *graphomotor* systems. The very content

of the written message is constructed with elements of language, in compliance with all phonological, lexical, grammatical and syntactic rules and principles. In addition, orthography and its rules must be obeyed in written speech, although, strictly speaking, orthography is at its core an interpreter of ways of speaking. So, for example, a pause, a sigh, a question, etc., according to the orthography in writing, we denote by a full stop, a comma, a question mark, etc. Accordingly, it can be concluded that orthographic signs accompany the acoustic properties of speech. The mentioned three systems (linguistic, visual, and graphomotor) develop for themselves from the beginning of childhood development and, by the time a child needs to master the act of writing, they interconnect (Van Galen, 1991; Smits-Engelsman & Van Galen, 1997; Longcamp, Anton, Roth & Velay, 2003; Longcamp, Boucard, Gilhodes, & Velay, 2006; Berninger et al., 2006).

The development of a child's handwriting is related to the maturity of fine motor skills, visual perception, phonological awareness, spatial orientation, attention, memory, executive functions, as well as other cognitive functions. Bojanin emphasizes the existence of certain periodization in the maturity of the child's handwriting, citing three phases: *pre-calligraphic* (preschool age), *calligraphic* (I and II grade of elementary school), and the *stage of individualization* of the handwriting (grade III of elementary school and further) (Bojanin, 1985).

This is also indicated by studies of the development of writing in the first grades of school age in which it was found that the act of writing develops rapidly during the first grade (age of six and seven), that it reaches a certain plateau in the second grade (age of seven and eight), that it further develops during the third grade (eighth and ninth years) when it becomes an automatic, organized and determined tool that enables the development of new ideas (Blöte & Hamstra-Bletz, 1991; Karlsdottir & Stefansson, 2002). However, some children experience difficulties in adopting writing (Schneck, Amundson, Case-Smith & O'Brien, 2010).

Written speech is the result of training that begins with the conscious mastery of the means of written expression of thoughts. However, the development of written speech ability is not the same as the development of oral speech ability, nor is writing related to the mere translation of voice speech into written characters. In addition, written speech cannot be regarded only as the mastering of writing technique. Writing is a complex psychomotor activity of proper graphic letter formatting which is coordinated with the thought process. This process involves the coordination of fine hand and fingers motor, visual perception, and nerve activity, and of psychic functions: attention, memory, logical and abstract thinking, as well as motivation (Maeland, 1992; Kaiser, Albaret & Doudin, 2009; Cornhill & amp; Case-Smith, 1996; Kulp, 1999; Barnhardt, Borsting, Deland, Pham & Vu, 2005; Volman, van Schendel & Jongmans, 2006; Ilanković & Ilanković 2001; Dimitrijeviç & Bjelakoviç, 2004). Written speech, in addition to the ability to

form letters and words, implies the existence and development of certain structures and functions which participate in the actual realization of the act of writing. The very act of writing is done by a graphomotor coupling which consists of arm muscles, above all those of fingers and hands, neuromuscular junctions and the organizer of writing in the central nervous system. In handwriting itself, the projection of harmonic lineation abilities, a certain rhythmic arrangement between letters and words, the direction in which the graphomotor act is accomplished, as well as the ability to form a graph are expressed. The above points to the conclusion that the act of writing is determined by the conception of space: the direction of the sequence, the rhythm of the arrangement of graphs in space, a certain "play" of tension and relaxation of the muscle masses participating in the act of writing, as well as the quality of emotionality of the person at the very moment of writing.

At the time when a child is being trained to write at school age many psychic functions which underlie the very act of writing are in the developmental stage, so that learning relies on insufficiently matured cognitive abilities, but also on insufficiently matured motor skills and sensorimotor abilities (Smits-Engelsman, Niemeijer & van Galen, 2001; Volman, van Schendel & Jongmans, 2006; Huau, Velay & Jover, 2015). There are many experts who emphasize that there is an optimal period for training a child in writing and they point out that it is closely related to the biological maturity of a child (Weil & Amundson, 1994; Cornhill & Case-Smith, 1996; Richards et al., 2011). It has been observed that in children between the ages of 5 and 7, a very intense and spontaneous desire for written speech appears, which does not occur to that extent at any other age. This is the main reason why this phenomenon is called explosive writing, and the very period of its occurrence is the sensitive period that is the most sensitive to this type of learning (Radoman, 2003). The well-known Russian psychologist Vigotski, studying children of this calendar age, also confirmed the existence of this sensitivity, but in his opinion, it is conditioned, first of all, by social, not biological origin, and it emerges as a product of the child's cultural development which is conditioned by teaching and cooperation. Written speech is linguistically similar to speaking, however, it is psychologically different from it. It does not imply the simple translation of phonemic characters into graphs, nor can it be reduced to the level of the graphomotor ability, but the act of writing itself requires a high level of mental transformation and abstraction. The writing skill itself involves mental transformation, that is, the translation of inner speech to the outer. Inner speech is essentially abstract, encrypted, maximally concise, and does not respect syntactic rules because it has its own syntax, as many psychologists point out. Mental transformation enables the emergence of elaborate and grammatically shaped voice speech. It is precisely the higher level of mental transformation that enables the translation of inner speech into external written speech, which is basically even more elaborated (Vigotski, 1983).

When studying the development of writing, researchers increasingly seek to look at it in relation to the cognitive, social and linguistic abilities of children, as well as the demands placed on them by the curriculum. Writing skill is not easy to adopt and factors that facilitate or hinder writing development are also being studied. Also, great attention is paid to the optimal position of the body when writing (Cornhill & Case-Smith, 1996; Feder & Maynemer, 2007). These considerations include the position of the hand, the clenching of fingers, the pressure of the pencil on the paper, the angle of the body relative to the writing paper, as well as the height of the chair which is used while writing. Thus, for example, a chair that is too low can cause the inhibition of finger movements and prevent the formation of a free letter, regarding the proper shaping of the graph. It also highlights the need to master simple strategies that involve moving paper when writing, selecting stationery and holding it properly.

The very act of the realization of writing, as we have already pointed out, implies the integration of the *linguistic, visual*, and *graphomotor systems* (Vladisavljević, 1991). This integration is achieved by a certain development of associative functions between the phoneme, articuleme, and grapheme. This means that there is a reciprocal action between them: the writing function evokes an auditory representation, a phoneme of the appropriate voice and a proper pronunciation, that the auditory representation of the phoneme triggers the appropriate articuleme and grapheme, that the visual memory of a particular grapheme causes an association with the auditory memory of the phoneme and articuleme.

It has long been known that writing disorders do not arise by chance, but that the origin of almost every difficulty can be explained. Considering that writing is the most complex human activity that integrates most of the brain's functions, impediments to writing cannot be interpreted merely as a lack of exercise of hand motor skills. Therefore, it can be said that graphomotor activity is directly related to visual perception, but it is not its sole, or decisive factor. Thus, it could be rightly emphasized that this is primarily a certain integration of complex afferent-efferent structures, which basically operate within the interactive operational composition of perception, motor, emotions, attention and memory (Rapaić, Nikolić & Nedović, 1995; Golubović & amp; Rapaić, 2008).

Graphomotor system involves mastering a certain skill of holding a pen (it is a normal grip with a "three-finger tripod" that forms an arch between the thumb and forefinger, while the palm or the outside of the hand is in a semicircle), paper, a hand and a forearm, as well as different directions when drawing lines (up, down, left, right, vertical, horizontal, circular from larger to smaller dimensions) (Ilanković & Ilanković, 2001; Dimitrijeviç & Bjelakoviç, 2004).

On the path of mastering these abilities, the problem becomes greater if some children experience deviations from the developmental milestones, created by the presence of motor, hearing, visual, speech-

language, intellectual, behavioral or multiple disorders. Such children, according to the traditional classification, were categorized into different categories of children with disorders of sensory, intellectual and psychomotor functions and were educated in special schools according to the type of disorders, which represented the medical model.

The legal foundation of inclusive education in the Republic of Serbia goes beyond that concept. A child with disabilities is: a child with an intellectual disability, a child with sensory impairment, a child with motor impairment, a child with learning disabilities, a child with speech and language impairment, a child with behavioral problems, a child with emotional disability, a child with developmental disabilities that occur simultaneously in several areas. A student with disabilities acquires basic education and upbringing as a rule in a regular school together with other students, and in a school for students with disabilities when it is in the best interests of students. Children, regardless of the type of disability, are educated in a school for the education of students with disabilities, and they are enrolled based on the opinion of the inter-ministerial commission. These children, limited by the existence of the primary disorder, acquire academic knowledge and skills significantly more difficulty than their peers of the typical population. Failure in school activities lowers their self-confidence and self-esteem, and a range of interpersonal problems can lead to behavioral problems or reinforce the existing problems in this area of children's functioning, so they need complex support with the implementation of an Individualized Education Plan (IOP).

In literature which deals with the problem of mastering writing, it is pointed out that 5 to 30% of children have difficulties mastering writing and that it depends on the class that children attend, the criteria for selecting a sample of students, and the instruments for writing assessment (Hooper, Swartz, Montgomery & Reed, 1993; Feder & Maynemer, 2007; Mogasale, Patil, Patil & Mogasale, 2012; Cortiella & Horowitz, 2014).

Aims and Research Tasks

Since writing is an ability that is essentially the integration of language, visual perception, and graphomotor skills, the main aim of the research we conducted was to examine the possibility and level of adoption of writing as a complex graphomotor act in children with disabilities in primary school age and, based on the results obtained, to propose appropriate measures to support children who have difficulties mastering writing as one of their academic skills.

The goal of the research we opted for assumed operationalization through the following tasks:

- Determine the ability to visually perceive the order, size, and shape of the figure in children with disabilities in primary school age;
- Examine the development of graphomotor abilities of children with disabilities in primary school age;

- Determine whether there are differences in visual perception and graphomotor abilities in children with disabilities with respect to gender;
- Determine if students with disabilities have difficulties mastering writing as a complex graphomotor act and the extent to which dysgraphia is present.

METHOD

The sample consisted of all children with disabilities of primary school age who attend "Vule Antić" Primary and Secondary School in Vranje[1]. We have shown the sample of the survey in Table 1.

Table 1. The sample of students according to gender and grade

Grade	Gender		Total
	Female	Male	
I	3	4	7
II	2	1	3
III	5	3	8
IV	4	-	4
V	-	8	8
VI	5	4	9
VII	4	5	9
VIII	-	10	10
Total	23	35	58

The instruments used in the research were:

- Prediction test for dysgraphia "Edge Ornament", which examined the ability to visually perceive the order, size, and shape of a figure, as well as graphomotor skills in children with disabilities in primary school age (Budimirović & Vladisavljević, 1983, by Kostić, Vladisavljević & Popović, 1983);
- Lilien Lirs graphomotor series (Ćordić & Bojanin, 1992);
- A Scale for assessment of dysgraphic forms in handwriting that examined the ability to write in children[2] (Ćordić & Bojanin, 1992).

[1] These are children with disabilities that manifest themselves simultaneously in several areas (combined disabilities)

[2] The scale for the assessment of dysgraphic forms in the handwriting was constructed by Ajuriaguerra and Ausias for the French language area, and was standardized for the Serbian Cyrillic alphabet

RESEARCH RESULTS

Visual Perception of Order, Shape and Figure Size

The ability to visually perceive order, shape, and figure size of the respondents was assessed by applying the Prediction test for dysgraphia, "Edge Ornament". Statistical processing of the obtained results was performed in SPSS Statistics 21. The obtained results are shown in Tables 2 and 3 and in Chart 1.

Table 2. Success on the "Edge Ornament" Prediction test

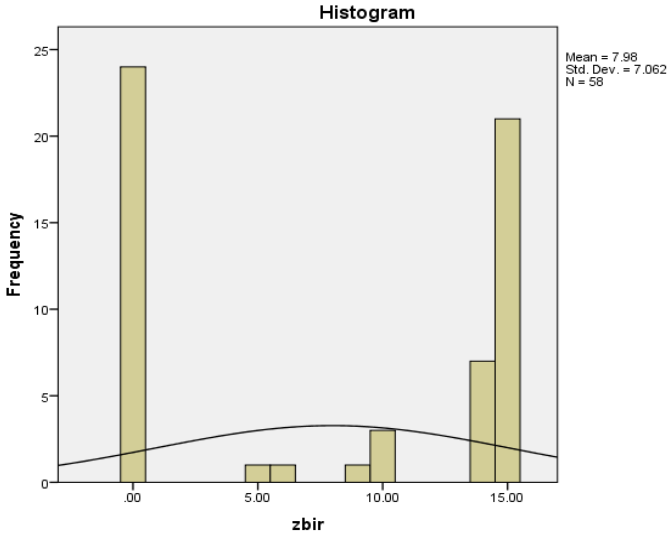
N	Valid	58
	Missing	0
Mean		7.9828
Median		10.0000
Mode		.00
Std. Deviation		7.06236
Minimum		.00
Maximum		15.00
Sum		463.00

Table 3. Success on Prediction test expressed by frequency of results achieved

Achieved results		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	24	41.4	41.4	41.4
	5.00	1	1.7	1.7	43.1
	6.00	1	1.7	1.7	44.8
	9.00	1	1.7	1.7	46.6
	10.00	3	5.2	5.2	51.7
	14.00	7	12.1	12.1	63.8
	15.00	21	36.2	36.2	100.0
	Total	58	100.0	100.0	

Based on the total success achieved on the Dysgraphic Prediction Test shown in Tables 2 and 3, as well as on Chart 1, it is evident that the respondents achieved a total of 463 points, which is 53% of the maximum number of points that could have been achieved on the test (870 points).

Also, the obtained results show that the highest number of respondents (24 or 41.4%) did not score a single point, while only 21 respondents or 36.2% solved the test successfully (M = 7.98, and SD = 7.062).



Graph 1. Graphic presentation of success on the "Edge Ornament" Prediction test

Taking into account the results obtained, we tested the existence of statistical differences in test success between female and male subjects by t-test of independent samples, both in terms of total results achieved and in terms of the success on individual test constructs (order, shape, size of figures, drawing around the edge and finishing the drawing).

The results of the t-test showed that there was no difference in success on the Prediction test between boys (M = 7.88, SD = 7.21) and girls (M = 8.13, SD = 6.98); t (56) = 0.128, p = 0.899 (two-sided). The difference between the mean values by groups (mean difference = 0.244, 95% CI: -4.08 to 3.59) was very small (eta squared = 0.0003).

Also, the results of the t-test of independent samples showed that there was no difference in success on the individual test constructs between boys and girls. The difference between the mean values by groups on each construct was very small.

Evaluation of the Execution of Lilien Lirs Graphomotor Series

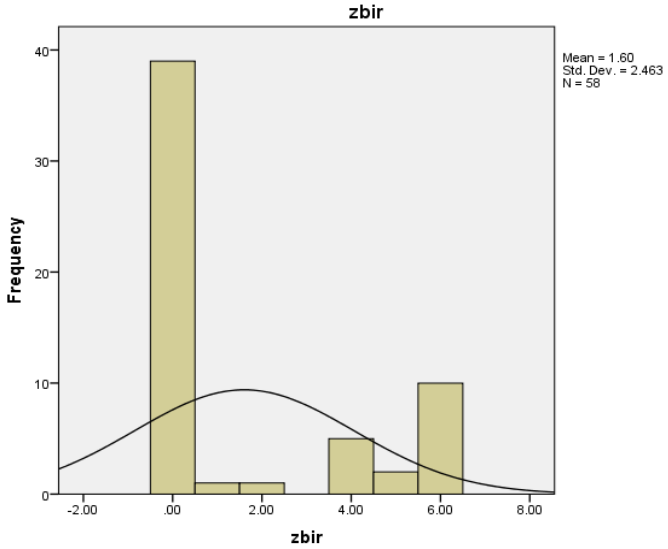
As part of graphomotor evaluation, we assessed the level of motor organization of the sample participants through the execution of Lilien Lirs graphomotor series. The results obtained are shown in Tables 4 and 5, as well as in Graph 2.

Table 4. The success of execution of Lilien Lirs graphomotor series

N	Valid	58
	Missing	0
Mean		1.6034
Median		.0000
Mode		.00
Std. Deviation		2.46334
Minimum		.00
Maximum		6.00
Sum		93.00

Table 5. The success of Lilien Lirs graphomotor series expressed by the frequency of results achieved

Achieved results		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	39	67.2	67.2	67.2
	1.00	1	1.7	1.7	69.0
	2.00	1	1.7	1.7	70.7
	4.00	5	8.6	8.6	79.3
	5.00	2	3.4	3.4	82.8
	6.00	10	17.2	17.2	100.0
	Total	58	100.0	100.0	



Graph 2. Graphic presentation of the successful execution of Lillien Lirs graphomotor series

Based on the overall success of Lilien Lirs graphomotor series shown in Tables 4 and 5, as well as in Chart 2, the respondents achieved a total of 93

points, which is 27% of the maximum number of points that could have been achieved on the test (348 points).

Also, the obtained results show that the highest number of respondents (39 or 67.2%) did not score a single point, while only 10 respondents or 17.2% successfully solved the test (M = 1.60, SD = 2.46).

Having in mind the results obtained, we examined the existence of statistical differences in the success of the Lilien Lirs graphomotor series test between female and male subjects by t-test of independent samples.

The results of the t-test of independent samples showed that there was no difference in success on Lilien Lirs graphomotor series test between boys (M = 2.00, SD = 2.65) and girls (M = 1.00, SD = 2,07); t (56) = -1.530, p = 0.113 (two-sided). The difference between the mean values by groups (mean difference = -1.00, 95% CI: -2.25 to 0.25) was small (eta squared = 0.04).

Assessment of Handwriting Dysgraphia

To evaluate the handwriting dysgraphia of the students' sample, we used a modified Scale for assessment of dysgraphic forms in handwriting by Ajuriaguerra and Ausias. In accordance with the instrument used, the sample of the subjects' handwriting was taken in three types of writing: *dictation*, *transcript*, and *free composition*.

Before presenting the obtained results of assessment of handwriting dysgraphia of the sample students, we must mention that we performed the handwriting dysgraphic evaluation on the sample of handwriting of 22 or 38% of students from a total of 58 sample students. The reason for this is, first of all, the fact that the other 36 or 62% of students could not write the appropriate text on the basis of which the handwriting sample was taken. Also, out of the total number of handwriting samples taken, the assessment of handwriting dysgraphia was performed on 16 or 73% of handwriting samples written in block letters and 6 or 27% of handwriting samples written in cursive.

The results of the evaluation of handwriting dysgraphia based on handwriting samples are presented in Tables 6 and 7.

Table 6. The results of the evaluation of handwriting dysgraphia concerning gender

Handwriting	Gender				Total	
	Male	%	Female	%	Students	%
Well* developed (0-9 points)	7	32	2	9	9	41
Ugly handwriting (10-13,5 points)	5	23	3	14	8	36
Dysgraphic handwriting (14 and more points)	1	5	2	9	3	14
Pronounced dysgraphic handwriting (19 and more points)	2	9	-	-	2	9
Total	15	68	7	32	22	100

*harmonious; delicate; shapely

Table 7. The results of the evaluation of handwriting dysgraphia in relation to grade and gender

Grade	Sex	Handwriting				Total	
		Well developed (0-9 points)	Ugly handwriting (10-13,5 points)	Dysgraphic handwriting (14 and more)	Pronounced dysgraphic handwriting (19 and more)	No.	%
I	M	-	-	-	-	-	-
	F	-	-	-	-		
II	M	-	-	-	-		
	F	1	-	-	-	1	4,5
III	M	-	-	-	-		
	F	-	-	1	-	1	4,5
IV	M	-	-	-	-		
	F	-	1	1	-	2	9
V	M	-	2	-	-	2	9
	F	-	-	-	-		
VI	M	-	2	-	-	3	14
	F	-	1	-	-		
VII	M	1	1	-	1	5	23
	F	1	1	-	-		
VIII	M	6	-	1	1	8	36
	F	-	-	-	-		
Total		9	8	3	2	22	100

DISCUSSION

On the basis of the overall success achieved on the Prediction test for dysgraphia "Edge Ornament" (shown in Tables 2 and 3, as well as in Chart 1), and related to the assessment of the visual perception of order, shape and size of the figures by the respondents, we can conclude that the respondents achieved significantly lower results than the possible maximum, both on individual test constructs and within the test as a whole. Achievement in the test as a whole is just over half of the maximum points, that is, a total of 463 points was achieved, which is 53% of the maximum number of points that could have been achieved in the test (870 points).

The obtained results show that a large number of subjects (24 or 41.4%) did not score a single point on the Prediction test for dysgraphia, while only 21 subjects or 36.2% successfully completed the test (M = 7.98, SD = 7.062). These results suggest that nearly half of the students with disabilities attending primary school do not have adequate readiness for initial writing classes.

Also, based on the results obtained by the respondents who were solving the Prediction test for dysgraphia, it can be concluded that the surveyed sample students constitute a very heterogeneous group of students

because the obtained results indicate a large dispersion of the results (SD = 7,062) relative to the obtained mean. Such a composition of students imperatively also requires respect for identified individual differences through the individualization of organization and conducting of teaching, in this particular case, of teaching initial writing.

Taking into account the results obtained, we tested the existence of statistical differences in test success between female and male subjects by the t-test of independent samples, both in terms of total results achieved and in terms of success on individual test constructs (order, shape, size of figures, drawing around the edge and finishing the drawing). Although girls scored better on average on the Prediction test for dysgraphia (M = 8.13, SD = 6.98) than boys (M = 7.88, SD = 7.21), the t-test results show that there is no statistically significant difference between the mean values by groups.

Also, the results of the t-test of independent samples showed that there was no difference in success on the individual test constructs between boys and girls. The difference between the mean values by groups on each construct was very small.

As part of the graphomotor evaluation, we assessed the level of motor organization of the sample participants through the execution of the Lilien Lirs graphomotor series.

The results of the conducted research (shown in Tables 3 and 4, as well as in Graph 2) show that the respondents achieved significantly lower results than the maximum possible on the execution of the graphomotor series. Achievement in the test as a whole is just under a third of the maximum points, that is, the total of 93 points was achieved, which is 27% of the maximum number of points that could have been achieved in the test (348 points). Also, the results show that almost two-thirds of the respondents (39 or 67.2%) did not score a single point, while only 10 respondents or 17.2% successfully completed the test (M = 1.60, SD = 2.46). These results further suggest that nearly half of students with disabilities attending primary school do not have adequate readiness for initial writing classes.

Having in mind the results obtained, we examined the existence of statistical differences in the success of the Lilien Lirs graphomotor series test between the female and male subjects by t-test of independent samples. Although on Lilien Lirs graphomotor series test, boys scored better on average (M = 2.00, SD = 2.65) than girls (M = 1.00, SD = 2.07), the t-test results show that there is no statistically significant difference between the mean values by groups.

Also, the results indicate that most students with disabilities, regardless of calendar age, are only at the stage of the first period of the development of handwriting (*the so-called pre-calligraphic phase*), which refers to the age of children before school.

To evaluate the handwriting dysgraphia, we used a modified Scale for assessment of dysgraphic forms in handwriting by Ajuriaguerra and

Ausias. In accordance with the instrument used, the sample of respondents' handwriting was taken in three types of writing: *dictation, transcript,* and *free composition*.

The evaluation of the handwriting dysgraphia, as noted above, was performed on the sample of handwriting of 22 or 38% of the total of 58 sample students. The reason for this is, first of all, the fact that the other 36 or 62% of the students could not write the appropriate text on the basis of which the handwriting sample was taken. Also, out of the total number of handwriting samples taken, the assessment of handwriting dysgraphia was performed on 16 or 73% of samples written in block letters and 6 or 27% of samples written in cursive.

By evaluating the handwriting dysgraphia (Table 6), we found that out of a total of 22 handwriting samples, 9 students or 41% had well-developed handwriting. In 8 or 36% of the students, the presence of ugly handwriting was estimated. Also, an assessment of handwriting dysgraphia revealed that 3 or 14% of the subjects had dysgraphic handwriting, while 2 or 9% had pronounced dysgraphic handwriting.

Based on the results presented in Table 7, we can conclude that dysgraphia is more common in boys (14%) than girls (9%). This result is in line with the results of previous studies (admittedly performed on a sample of typically developed children) in which a more frequent presence of dysgraphia was observed in boys than in girls (Matanović-Mamužić, 1982; Brakus, 2003; Golubović & Čolić, 2010; Golubović, 2012).

Based on the results obtained from our research, it would not be too liberal to conclude that the identified occurrence of dysgraphia in a sample of students with developmental disabilities is due, first of all, to CNS damage, and not a consequence of uneven development of psychomotor coupling structures (developmental dysgraphia). We think that the lack of writing ability, observed in 36 or 62% of sample students, is a consequence of CNS damage. This applies, above all, to students with disabilities attending school who have been enrolled in school since the application of the Law on the Basics of Education and Upbringing System that introduced inclusive education.

When it comes to the evaluation of handwriting dysgraphia in relation to age, the study identified well-developed handwriting in only one student attending grade II. It is a Roma girl who has been educationally neglected. The other 7 students with harmonious development of handwriting attend older grades (2 attend VII grade and 6 attend VIII grade).

The results of the research accurately indicate the developmental characteristics of students with disabilities and imperatively impose the need to provide appropriate complex support planned by IOP in order to master writing as one of their academic skills. Success in mastering the act of writing is based on appropriate principles and exercises that would first individually and then integrally influence the stimulation of those ar-

eas where the act of writing rests. Holding longer attention in preparation for initial writing increases both children's safety and their ability to respond to the demands placed on them, thus enabling them to progress gradually. The first principle on the path to introducing children to writing consists in parsing speech to the level of phoneme. This means that the analysis leads to a statement (sentence) which is further broken down into words and, further, a successive sequence of voices in one word. After that, the reverse process of synthesizing voices into a meaningful word is applied. Also, phoneme discrimination and proper articulation of each voice need to be practiced. In addition, it is necessary to develop a visual perception of the basic shapes of the grapheme in the child, mastering the space, position and size of the grapheme, as well as visual memory of the grapheme. To this end, it is necessary to practice with children the disassembly and assembly of letters of different materials, of different sizes, but in recognizable shapes, first by model, and then without it, based on visual memory with appropriate verbal stimuli for association with similar and familiar children objects.

In addition to the above content, which is mainly oriented to perceptual development, it is necessary to plan and organize series of exercises for the child's motor development. To this end, games with as many shaping materials as possible should be used to exercise the fine motor skills of the hands and fingers in children. Also, for the preparatory period of initial writing it is necessary to plan the writing of prescriptive forms over a long period of time.

CONCLUSION AND LIMITATIONS

Based on the results obtained in the conducted research, the following can be concluded:

1. The assumption that the ability to visually perceive order, size, and shape of a figure in children with disabilities of primary school age differs from one another in relation to the sex of children proved to be incorrect. Namely, the results of the t-test showed that there was no difference in success in the Prediction test between boys (M = 7.88, SD = 7.21), or girls (M = 8.13, SD = 6.98); t (56) = 0.128, p = 0.899 (two-sided). The difference between the mean values by groups (mean difference = 0.244, 95% CI: -4.08 to 3.59) was very small (eta squared = 0.0003).

Also, the results of success in the Prediction test show that the highest number of respondents (24 or 41.4%) did not score a single point, while only 21 respondents or 36.2% completed the test successfully (M = 7.98, and SD = 7,062). These results suggest that this is an extremely heterogeneous group of students, and that nearly half of students with disabilities attending primary school do not have adequate readiness for initial writing classes. This statement implies new conclusions regarding the or-

ganization and conducting of initial writing classes, but also teaching in general, which we will discuss later.

2. The assumption that there are statistically significant differences regarding the gender of children with disabilities of primary school age in relation to the development of graphomotor skills has also proved to be incorrect. Namely, by assessing the level of motor organization of the subjects covered by the sample through the execution of the Lilien Lirs graphomotor series, a total score of 93 points was achieved, which is 27% of the maximum possible number of points that could have been achieved on the test (348 points). In addition, the highest number of subjects (39 or 67.2%) on this test did not score a single point, while only 10 subjects or 17.2% successfully solved the test (M = 1.60, SD = 2.46).

Having in mind the results obtained, we examined the existence of statistical differences in the success of the Lilien Lirs graphomotor series test between female and male subjects by the t-test of independent samples. The results of the t-test of independent samples showed that there was no difference in success of Lilien Lirs graphomotor series test between boys (M = 2.00, SD = 2.65) and girls (M = 1.00, SD = 2,07); t (56) = -1.530, p = 0.113 (two-sided). The difference between the mean values by groups (mean difference = -1.00, 95% CI: -2.25 to 0.25) was small (eta squared = 0.04).

Such results also point to the fact that in these students there is no specific motor maturity necessary for mastering the act of writing as a precise psychomotor activity. Also, the findings further support our previous conclusion that most students with disabilities who attend a school for children with disabilities do not have the readiness to pursue initial writing.

3. The assumption that children with disabilities are more likely to have problems with writing and dysgraphia has proven to be correct. By assessing the handwriting dysgraphia using the Scale for assessment of dysgraphic forms by Ajuriaguerra and Ausias, we found that out of a total of 22 handwriting samples, 9 students or 41% had well-developed handwriting. In 8 or 36% of students, the presence of ugly handwriting was assessed. Also, by assessing the handwriting dysgraphia, it was found that 3 or 14% of the subjects had dysgraphic handwriting, while 2 or 9% had pronounced dysgraphic handwriting. If we add 36 or 62% of the sample students who could not write the appropriate text on the basis of which the handwriting sample was taken, which could be said to have pronounced dysgraphia, then the picture of the presence of problems with writing and dysgraphia is clearer.

Based on the results of the handwriting dysgraphic evaluation, we found that 3 boys (14%) and 2 girls (9%) have a dysgraphic handwriting, which suggests that dysgraphia is more common in boys than girls.

Based on the results obtained from our research, it would not be too liberal to conclude that the identified occurrence of dysgraphia in a sample of students with disabilities is due, above all, to CNS damage, and not the consequence of uneven development of psychomotor coupling structures (developmental dysgraphia). Also, we find that the lack of writing ability observed in 36 or 62% of sample students is due to CNS damage. This applies, above all, to students with disabilities attending school who have been enrolled since the implementation of the Law on Basics of Education and Upbringing System introducing inclusive education. Therefore, with the introduction of inclusive education since 2010, most children who do not have the necessary minimum abilities to master writing skills as one of their academic skills, were enrolled at "Vule Antić" School in Vranje. Bearing in mind the mentioned statement and the fact that the curriculum for regular elementary schools is applied with these students, the question arises as to whether the planned contents of teaching initial writing, and consequently the teaching of Serbian language, can be achieved or not, and to what extent? The answer to the question, according to the results of our research, indicates the significant presence of difficulties in adopting writing by children with disabilities, as well as the inability to adopt it in majority of children. However, confirming or denying this answer requires new and broader research of this issue on a larger and representative sample. The mentioned statement also indicates some limitations in the research we have done. Therefore, the basic limitation of the conducted research is reflected in the size of the sample, as well as in the inability to compare the obtained results with other surveys, because we could not find the same or similar ones.

Effective teaching of students with disabilities, according to the results obtained, imperatively imposes the need to respect the developmental characteristics of this student population and to individualize the initial teaching of writing. This entails major changes to the standards and outcomes of achievements required by the regular curriculum and the development of an IOP for each student with more complex individualized contents to support the child's adoption of writing. However, it would not be too liberal to say that working effectively with them also entails the need to adopt specific curricula intended for teaching in schools for students with disabilities.

Finally, we would conclude our consideration within this section of the paper by stating that future research of the selected problem should eliminate the abovementioned shortcomings and include among other things, the problems and opportunities to acquire other academic skills for children with disabilities of primary school age.

REFERENCES

Barnhardt, C., Borsting, E., Deland, P., Pham, N., & Vu, T. (2005). Relationship between visual-motor integration and spatial organization of written language and math. *Optometry & Vision Science*, *82*(2), 138-143.

Berninger, V. W., Abbott, R. D., Jones, J., Wolf, B. J., Gould, L., Anderson-Youngstrom, M., Apel, K. (2006). Early development of language by hand: Composing, reading, listening, and speaking connections; three letter-writing modes; and fast mapping in spelling. *Dev Neuropsychol*, *29*(1), 61-92.

Бојанин, С. (1985). *Неуропсихологија развојног доба и општи реедукативни метод* [Neuropsychology of developmental age and general reeducational method] Београд: Завод за уџбенике и наставна средства.

Blöte, A. W., & Hamstra-Bletz, L. (1991). A longitudinal study on the structure of handwriting. *Percept Mot Skills*, *72*(3), 983-994.

Бракус, Р. (2003). *Развојне дислексије и дисграфије*. [Developmental dyslexia and dysgraphia] Београд: Задужбина Андрејевић.

Cornhill, H., & Case-Smith, J. (1996). Factors that relate to good and poor handwriting. *American Journal of Occupational Therapy*, *50*(9), 732-739.

Cortiella, C., & Horowitz, S. H. (2014). The state of learning disabilities: Facts, trends and emerging issues. *New York: National Center for Learning Disabilities*.

Dimitrijeviç, L., & Bjelakoviç, B. (2004). Development of cardinal motor skills in the first year of life. *Acta Facultatis Medicae Naissenis*, *21*, 253-257.

Feder, K. P., & Majnemer, A. (2007). Handwriting development, competency, and intervention. *Developmental Medicine & Child Neurology*, *49*(4), 312-317.

Голубовић, С. (2012). *Развојни језички поремећаји*. [Developmental linguistic disorders] Београд: Друштво дефектолога Србије.

Голубовић, Ш., Рапаић, Д. (2008). Допринос неуромишићне зрелости квалитету извршавања графомоторних задатака. [Contribution of neuromuscular maturity to the quality of execution of graphomotor tasks] *Специјална едукација и рехабилитација*. Универзитет у Београду Факултет за специјалну едукацију и рехабилитацију, 122–133.

Голубовић, С., Чолић, Г. (2010). Артикулационе способности деце предшколског узраста. [Articulation skills of preschool children] *Специјална едукација и рехабилитација, бр. 2*, 301–315.

Huau, A., Velay, J.L., & Jover, M. (2015). Graphomotor skills in children with developmental coordination disorder (DCD): Handwriting and learning a new letter. *Hum Mov Sci*, *42*, 318-332.

Hooper, S. R., Swartz, C. W., Montgomery, J. W., & Reed, M. S. (1993). Prevalence of writing problems across three middle school samples. *School Psychology Review*.

Ilanković, V., & Ilanković, N. (2001). *Psihomotorni razvoj deteta*. [Psychomotor development of the child] Beograd: Medicinski fakultet, Univerziteta u Beogradu.

Kaiser, M.L., Albaret, J.M., & Doudin, P.A. (2009). Relationship between visual-motor integration, eye-hand coordination, and quality of handwriting. *Journal of Occupational Therapy, Schools, & Early Intervention*, *2*(2), 87-95.

Karlsdottir, R., & Stefansson, T. (2002). Problems in developing functional handwriting. *Percept Mot Skills*, *94*(2), 623-662.

Kostić, Đ., Vladisavljević, S., Popović, M. (1983). *Testovi za ispitivanje govora i jezika.* [Speech and language tests] Beograd: Zavod za udžbenike i nastavna sredstva.

Kulp, M. T. (1999). Relationship between visual motor integration skill and academic performance in kindergarten through third grade. *Optometry & Vision Science, 76*(3), 159-163.

Maeland, A. F. (1992). Handwriting and perceptual-motor skills in clumsy, dysgraphic, and 'normal'children. *Percept Mot Skills, 75*(3 suppl), 1207-1217.

Матановић-Мамужић, М. (1982). *Тешкоће у читању и писању*. [Difficulty reading in writing] Загреб: Школска Књига.

Mogasale, V. V., Patil, V. D., Patil, N. M., & Mogasale, V. (2012). Prevalence of Specific Learning Disabilities Among Primary School Children in a South Indian City. *The Indian Journal of Pediatrics, 79*(3), 342-347. doi: 10.1007/s12098-011-0553-3.

Longcamp, M., Anton, J.L., Roth, M., & Velay, J.L. (2003). Visual presentation of single letters activates a premotor area involved in writing. *Neuroimage, 19*(4), 1492-1500.

Longcamp, M., Boucard, C., Gilhodes, J.C., & Velay, J.L. (2006). Remembering the orientation of newly learned characters depends on the associated writing knowledge: A comparison between handwriting and typing. *Hum Mov Sci, 25*(4), 646-656.

Радоман, В. (2003). *Психологија језика и језичких поремећаја*. [Psychology of language and language disorders] Београд: Дефектолошки факултет.

Рапаић, Д., Николић, С., Недовић, Г. (1995). Анализа графомоторних способности код деце са церебралном парализом. [Graphomotor ability analysis in children with cerebral palsy] *Дефектолошка теорија и пракса,* Београд, бр. 1, 81–88.

Richards, T. L., Berninger, V. W., Stock, P., Altemeier, L., Trivedi, P., & Maravilla, K. R. (2011). Differences between good and poor child writers on fMRI contrasts for writing newly taught and highly practiced letter forms. *Read Writ, 24*(5), 493–516.

Schneck, C., Amundson, S., Case-Smith, J., & O'Brien, J. (2010). Prewriting and handwriting skills. *Occupational therapy for children, 6*, 555-580.

Smits-Engelsman, B. C., Niemeijer, A. S., & van Galen, G. P. (2001). Fine motor deficiencies in children diagnosed as DCD based on poor grapho-motor ability. *Hum Mov Sci, 20*(1), 161-182.

Smits-Engelsman, B. C., & Van Galen, G. P. (1997). Dysgraphia in children: Lasting psychomotor deficiency or transient developmental delay? *J Exp Child Psychol, 67*(2), 164-184.

Van Galen, G. P. (1991). Handwriting: Issues for a psychomotor theory. *Hum Mov Sci, 10*(2-3), 165-191.

Виготски, Л. С. (1983). Мишљење и говор. [Opinion and speech] Београд: Нолит.

Владисављевић, С. (1991). *Дислексија и дисграфија.* [Dyslexia in dysgraphia] Београд: ЗУНС.

Volman, M., van Schendel, B. M., & Jongmans, M. J. (2006). Handwriting difficulties in primary school children: A search for underlying mechanisms. *American Journal of Occupational Therapy, 60*(4), 451-460.

Weil, M. J., & Amundson, S. J. C. (1994). Relationship between visuomotor and handwriting skills of children in kindergarten. *American Journal of Occupational Therapy, 48*(11), 982-988.

Ђордић, А., Бојанин, С. (1992). *Општа дефектолошка дијагностика*. [General defectological diagnostics] Београд: Завод за уџбенике и наставна средства.

ПИСАЊЕ КОД ДЕЦЕ СА СМЕТЊАМА У РАЗВОЈУ

Луција Ђорђевић[1], Србољуб Ђорђевић[2], Љиљана Митић[2]
[1]ШОСО „Вуле Антић", Врање, Србија
[2]Универзитет у Нишу, Педагошки факултет у Врању, Врање, Република Србија

Резиме

Графомоторне способности, визуелна перцепција и издиференцирана употребна латерализованост представљају битне предуслове за овладавање писањем, као једном од академских вештина која се усваја на основношколском узрасту. Ове способности се почињу развијати још у раном детињству. На путу овладавања наведеним способностима проблем постаје већи уколико дође до одступања од миљоказа развоја, насталих присуством моторичких, слушних, визуелних, говорно-језичких, интелектуалних поремећаја, поремећаја у понашању или вишеструких поремећаја. Ова деца, ограничена постојањем примарног поремећаја, значајно теже од својих вршњака типичне популације усвајају академска знања и вештине. Предмет нашег истраживања био је да се испита стање писања код ученика основношколског узраста са сметњама у развоју, као и тешкоће које се јављају код ученика на путу овладавања овом академском вештином. Узорак истраживања чинило је 58 ученика (од чега 23 женског пола) основношколског узраста са сметњама у развоју. У извршеном истраживању коришћена је техника тестирања, а од инструмената Предикциони тест за дисграфију „Рубни орнамент", Графомоторни низ „Лилијен Лирс" и Скала за процену дисграфичних форми у рукопису. Добијени резултати показују да велики број испитаника (24 или 41,4%) није остварио ниједан поен на Предикционом тесту за дисграфију, док је само 21 испитаник или 36,2% успешно решио тест (M = 7,98, а SD = 7,062). Резултати т-теста независних узорака показују да не постоји разлика у успеху на Предикционом тесту између дечака (M = 7,88, SD = 7,21), односно девојчица (M = 8,13, SD = 6,98); t (56)= 0,128, p = 0,899 (обострано). Разлика између средњих вредности по групама (просечна разлика = 0,244, 95% CI: –4,08 до 3,59) била је врло мала (ета квадрат = 0,0003). Такође, добијени резултати показују да највећи број испитаника (39 или 67,2%) није остварио ниједан поен на тесту Лилијен Лирс, док је само 10 испитаника или 17,2% успешно решило тест (M = 1,60, SD = 2,46). Резултати т-теста независних узорака показују да не постоји разлика у успеху на тесту извршења графомоторног низа Лилијен Лирс између дечака (M = 2,00, SD = 2,65), односно девојчица (M = 1,00, SD = 2,07); t (56)= –1,530, p = 0,113 (обострано). Разлика између средњих вредности по групама (просечна разлика = –1,00, 95% CI: –2,25 до 0,25) била је мала (ета квадрат = 0,04). Проценом дисграфичности рукописа применом Скале за процену дисграфичних форми у рукопису Ажириагере и Озиаса утврдили смо да од укупно 22 узорка рукописа код 9 ученика или 41% постоји складно развијен рукопис. Код 8 или 36% ученика проценом је утврђено присуство ружног рукописа. Такође, проценом дисграфичности рукописа је утврђено да дисграфичан рукопис има 3 или 14% испитаника, док 2 или 9% испитаника има изражено дисграфичан рукопис. Ако овом броју додамо и 36 или 62% ученика узорка који нису могли да напишу одговарајући текст на основу кога се узима узорак рукописа, за које се може рећи да имају изражену дисграфију, онда слика о присуству проблема са писањем и дисграфијама бива јаснија. На основу извршеног истраживања, закључујемо да ефикасан наставни рад са ученицима са сметњама у развоју, сходно добијеним резултатима, императивно намеће потребу поштo-

вања развојних карактеристика ове популације ученика и индивидуализацију почетне наставе писања, као и знатне измене стандарда и исхода постигнућа који се захтевају по редовном наставном плану и програму. Међутим, не би било прелободно рећи да ефикасан рад са овом популацијом ученика подразумева и потребу доношења и посебних наставних планова и програма намењених за наставни рад у школама за ученике са сметњама у развоју.