Joined-up Linear Handwriting in Elementary Grades in the Context of Postponed Compulsory School Attendance

Martina Fasnerová

Abstract

The paper presents a long-term research study carried out in primary schools in Olomouc. The author introduces only a single part of this extensive research study performed in 2009 – 2013. The paper presents an assessment of joined-up linear handwriting in the context of postponed school attendance in selected quality-based categories.

Keywords: joined-up linear handwriting, postponed school attendance, primary school, teaching of handwriting, quality features of handwriting.

Introduction

One of the typical human means of capturing, analysing and transferring information and one's own experience to other people is handwriting. This is a human product without which the human race would not have reached such development in the society. Even today, through preserved written relics we can learn about new civilizations, analyse human and world progress and at the same time learn about ourselves. Through handwriting each individual acquires education and extends their own knowledge.

With respect to the fact that handwriting has an indispensable role in the development of literature as such, it is also a part of the level of education of each nation and expresses the nation's identity. Handwriting is even introduced to very young children. Handwriting is determined by graphomotor movement. Functional coordination of handwriting is ensured by the central nervous system and thus it can be assumed that certain mental aspects of an individual are identically projected into the graphical form of language, i. e. handwriting. It is not an intention of this paper to analyse handwriting in terms of graphology and assess handwriting in the context of the mental condition of an individual because such diagnostics can only be performed after complete mental maturation of an individual, i. e. in adulthood. The aim of the paper is to focus on current issues associated with the handwriting of primary school pupils, i. e. factors that can have an influence on their success in this area.

1 Effect of postponed school attendance on the handwriting of primary school pupils

One of the factors that we encountered and that could influence the handwriting of primary school pupils is postponed compulsory school attendance by one year. In the Czech Republic, enrolment in basic schools is governed by Act No. 561/2004 Coll. on preschool, basic, secondary, higher professional and other education as last amended (hereinafter referred to as the Education Act). As far as legislation is concerned, postponed school attendance is covered by the Education Act, namely by Sections 36–38, Clause 1 of Act No. 561/2004 Coll.

Postponed school attendance by one year is very important as this is a preventive measure that should protect a child that is immature for education against academic failure (Klégrová, 2003).

Prior to school enrolment a child should be well equipped with competencies in many areas of development including the areas of motor skills and graphomotor skills that have a significant effect on the level and training of elementary handwriting in grade one of basic school. In this context, we were interested in the ways postponed school attendance influences the success of elementary grade pupils in practicing joined-up linear handwriting.

The purpose of the present paper is to perform an analysis of current linear joined-up handwriting taught to elementary grade pupils in the context of postponed school attendance by one year. Pupils acquire experience in the writing technique or writing automation during classes in primary school. The basics of graphomotor skills are built already during pre-primary education. The aim of the paper was to compare and analyse the factors that have an effect on the quality of pupils' handwriting. These factors

include for example the level of graphomotor skills acquired in kindergarten and the effect of postponed school attendance on problem-free enrolment in basic education.

As far as handwriting is concerned, various letters or numerals consist of one or more elements that differ not only in their shape but also in their graphical execution. For these reasons it is of vital importance for a beginning writer to first learn these elements of numerals and letters and only then the whole shapes and their linkage.

"Handwriting originates as a trace of hand movement, which is in essence circular." (Penc, 1968, 24) This movement produces circles that are prolonged in various ways to produce ovals.

In case of joined-up linear handwriting quality-based and quantity-based handwriting elements can be assessed. In this paper we will not deal with quantity elements, i. e. handwriting speed because this category appears irrelevant in terms of our research. Instead, we will describe selected elements of quality handwriting features, i. e. only those that appeared topical for the purposes of our assessment in comparison with a different handwriting model, i. e. Comenia Script, which is included in a wider research intent whereas this paper presents only partial research outcomes.

2 Quality-based handwriting features

Penc (1968), Křivánek, Wildová (1998), Fabiánková, Havel, Novotná (1999) as well as Mlčáková (2009) refer to the following quality-based handwriting features:

- Letter shape,
- Handwriting size,
- Proportionality of handwriting size,
- Regularity of handwriting size,
- Joined-up nature and linkage of handwriting,
- Handwriting inclination,
- Handwriting density and rhythmization,
- Neatness of written documents.

Jarmila Wagnerová (1998) adds pressure exerted on the writing pad.

Proportionality of handwriting size

According to Křivánek and Wildová (1998, 73) *"the ratio between letters of medium height (i, e,…), upper length (l, h,…) and lower length (y, j,…) should be 1 : 1 : 1."*

This is a height ratio between letters. It can be assumed that the size of upper and lower loops is identical with the medium letter height.

Beginning writers tend to prolong upper or lower loops. Mlčáková (2009, p. 26) ranks handwriting proportionality and regularity among the categories for quality assessment. *"Regularity is understood as maintaining identical heights in the same handwriting types".*

On the contrary, Penc (1968) classifies letter regularity as an independent handwriting quality.

Regularity of handwriting size

Handwriting regularity is understood as maintaining the same height ratios between letters.

Most authors (Hřebejková, 1987, Křivánek, Wildová, 1998, Doležalová, 1998, Mlčáková, 2009) who deal with initial writing recommend to provide auxiliary lines at a height of 5–6 mm for the medium letter height in the elementary grade in order to improve the training of handwriting regularity. However, this is not recommended for all pupils, only those with difficulties.

Joined-up nature and linkage of handwriting

The joined-up nature of words has been present throughout the whole period of development lasting for a thousand years. To increase the effectiveness of handwriting in the gothic period writers tried to develop practical ways of joining letters. Connectedness or joined-up nature and linkage of letters present a significant requirement in order to preserve legibility and neatness. Almost all lowercase letter can be written using a single stroke. Only the letter "x" requires two strokes. In the uppercase alphabet, all letters except "K, T, X, F" are also single-stroke. The mentioned uppercase letters are written using two strokes, the letter F requires three strokes.

Doležalová (1998) deals with the issue of writing letters with diacritical marks. The author recommends immediate writing of diacritical marks, i. e. interrupt the word, write a diacritical mark and continue with the word. As suggested by the author, however, the linkage of the word can be disrupted. Therefore, at first, writers must be taught to write words without diacritical marks, only after movement automation easier linkage takes place.

On the contrary, Mlčáková (2009) is inclined to think that writers should first learn to write the whole word and only after that check its correctness by means of autodictation. Interrupting the linkage of letters with diacritical marks is recommended by the author only in case of dysgraphic pupils.

Křivánek, Wildová (1998) recommend not to overestimate the linkage of words. Especially in beginning writers (grade one of basic school) they recommend to approach

this issue on an individual basis. Under no circumstances should writers be forced to maintain the joined-up nature of the whole word to the detriment of further motivation.

Some letters can be classified as connecting, some as non-connecting. Uppercase hand-written letters are always connected from the right-hand side as they are used to begin a word or a sentence. The letters T, F, P are non-connecting. For letters that end with a left stroke (letter B), connecting to another letter is performed using the so-called back (cover) strokes (Penc, 1968). Back strokes do not deform writing; on the contrary, they contribute to improved legibility.

Neatness of written documents

Overall neatness of written documents should be held in mind by writers. Beginning writers who still tackle the writing technique, as suggested by Křivánek, Wildová, (1998) Doležalová, (1998), Mlčáková (2009) should maintain handwriting from the beginning to the end of the line so that their handwriting is legible and neat. With increasing age of a young writer and with more writing experience the neatness of written documents tends to decrease. This is especially apparent by implementing the elements of block letters into handwriting. In her surveys, this fact was observed by the graphic designer Radana Lencová during the development of Comenia Script handwriting, which was proposed as an alternative to the existing handwriting in 2010.

3 Definition of research area

Since 2010 primary schools providing basic education have been able to use a handwriting model for elementary training of handwriting named Comenia Script. In this context we defined the research area, i. e. whether the previous standard of joined-up linear handwriting is suitable for pupils in primary school. And also, to what extent is the prescribed standard observed by elementary grade pupils with respect to postponed school attendance by one year.

3.1 Research preparation

During the first stage of the research we prepared a theoretical basis by studying Czech as well as foreign literature on this topic. The study of relevant research summaries revealed that recently there has not been a research study in the Czech Republic that would assess quality-based features of joined-up linear handwriting by means of quantity-based research methods. For these reasons we defined the criteria according to which the research was carried out.

3.2 Formulation of research problem

Based on a literary review and having revealed the absence of empiric results the research area was narrowed down and the main research problem was formulated: Is joined-up linear handwriting a suitable model for teaching elementary handwriting to primary school pupils?

This paper does not describe the whole extent of the research in this area but rather a single part thereof, i. e. assessment of quality-based handwriting features in the context of one variable. i. e. postponed school attendance by one year.

3.3 Objectives of research study

The main objective of the research study was to assess and analyse the degree of observance the presented handwriting standard during an assessment of quality-based features of joined-up linear handwriting by means of quality-based research methods.

Therefore, the key question of the research study was whether the current model of joined-up linear handwriting is suitable for today's pupils and whether it corresponds with the requirements of today's day and age. This question was further particularized by partial questions that served as a specific guidance for the selection and modification of research tools and analysis of the data obtained:

- Does postponed school attendance influence the legibility of pupils' handwriting?

3.4 Research hypotheses

Based on the formulation of the research objective and partial objectives the following hypotheses were formulated.

Material hypothesis No. 1: The joined-up nature and connectedness of various graphemes in the handwriting of an individual with postponed compulsory school attendance by one year shows greater errors than the joined-up nature and connectedness of various graphemes in the handwriting of an individual without postponed compulsory school attendance by one year.

2 H_0: The joined-up nature and connectedness of various graphemes in the handwriting is not dependent upon postponed compulsory school attendance by one year.

2 H_A: The joined-up nature and connectedness of various graphemes in the handwriting is dependent upon postponed compulsory school attendance by one year.

Material hypothesis No. 2: Proportionality and regularity of various graphemes in the handwriting of an individual with postponed compulsory school attendance by one year shows greater errors than the joined-up nature and connectedness of various

graphemes in the handwriting of an individual without postponed compulsory school attendance by one year.
3 H_0: Proportionality and regularity of various graphemes in the handwriting is not dependent upon postponed compulsory school attendance by one year.
3 H_A: Proportionality and regularity of various graphemes in the handwriting is dependent upon postponed compulsory school attendance by one year.

Material hypothesis No. 3: Individuals with postponed compulsory school attendance by one year report a higher degree of neatness of written documents than individuals without postponed compulsory school attendance by one year.
4 H_0: The degree of neatness of written documents is not dependent upon postponed compulsory school attendance by one year.
4 H_A: The degree of neatness of written documents is dependent upon postponed compulsory school attendance by one year.

3.5 Preliminary research and development of research tools

The primary research method was a test probe carried out through a non-standardized interview with teachers of randomly selected schools. During 2005–2007 when teachers started to prepare for the development of School educational programmes, a group of teachers was formed in Olomouc that attempted to address the issue of handwriting of primary school pupils. The data acquired through interviews with basic school teachers during one year were included in the analysis only as a sort of an input probe (screening) serving to reveal the opinions about and attitudes to the research issue. These findings were used for easier orientation in the issue and in order to develop a group of teachers and pupils for a longitudinal research study, the aim of which was to assess the handwriting of specific pupils by means of quality-based handwriting features that present the basic research tool.

We addressed teachers from 10 basic schools who were also the coordinators of the development of School educational programmes and who taught in primary school. To improve the teaching process and to follow the School educational programme, their objective was to assess written documents of their pupils in their classes. As there were numerous problems and issues, a team of teachers was formed to deal with the assessment of quality-based features of various letters and written documents of pupils on a systematic basis for a period of 5 years (i. e. the whole primary school attendance).

For purposes of objectiveness of assessment of joined-up linear handwriting of pupils, the assessors were selected by the snowball technique. According to Hendl (2008) this is a popular selection method in quality-based research, during which a researcher selects a few individuals for assessment and these individuals add on other

assessors until there is a group of selected individuals who are in agreement in terms of assessment.

A total of 10 handwriting samples of pupils were originally assessed by 3 assessors whose task was to observe individual groups of handwriting, i. e. specifically determined categories. Based on the snowball technique principle, eventually four assessors were selected, all teachers in primary school.

The assessed written documents were also considered for other aspects that have crucial importance with respect to the research. These aspects were also used as category variables in the hypotheses of the research. One of these variables was postponed compulsory school attendance by one year, i. e. issue addressed by this paper.

The data for the assessment of quality-based features of handwriting of primary school pupils were processed by the ***Mann-Whitney U-test*** quantity-based statistical method.

For the formulated null and alternative hypotheses we calculated a test criterion used to confirm or disprove the hypotheses. Significance testing was performed at a significance level of $\alpha = 0.05$.

To determine the degree of agreement the ***Kendall's coefficient of concordance*** was applied. The Kendall's coefficient uses values from 0 to +1. The higher the values the more agreement there is between the ranks compared (Chráska, 2007).

In assessing and processing multiple results it was necessary to well 'represent' the measured values, i. e. characterize them in an apt and brief way. For these purposes we used the ***arithmetic mean*** and ***median***. Through the median we ranked the values by their size and the sample was divided into two parts. In case there was no statistical data significance, the results were further interpreted using the median.

The obtained data were analysed and processes using the Excel and Statistica 12 programmes and converted into graphs and tables.

3.6 Research sample

To assess the obtained data it is necessary to outline factual data used during the process of assessment.

In the research we worked with 98 respondents (of elementary grades), whose average age was 7.5 years. The youngest respondent was 7 years old; the oldest respondent was 8 years and 4 months old. Out of the total number of respondents, 53 were girls, i. e. 54.08%, and 45 were boys, i. e. 45.92%

Table 1
Age of respondents

Category	All Groups Frequency table: pohlavi (Data Fasnerová.sta) Count	Cumulative Count	Percent	Cumulative Percent
D	53	53	54,08163	54,0816
CH	45	98	45,91837	100,0000
Missing	0	98	0,00000	100,0000

Another variable was **postponed school attendance** by one year. Out of the total number of 98 respondents, 11 pupils had postponed school attendance, i. e. 11.22%, and 87 were without postponed school attendance, i. e. 88.77%, the total number of respondents being 98.

Table 2
Postponed school attendance

Category	All Groups Frequency table: Odklad (Data Fasnerová.sta) Count	Cumulative Count	Percent	Cumulative Percent
A	11	11	11,22449	11,2245
N	87	98	88,77551	100,0000
Missing	0	98	0,00000	100,0000

3.7 Hypothesis proving

The formulated hypotheses were verified for statistical significance and the results were commented on in detail.

Material hypothesis No. 1: The joined-up nature and connectedness of various graphemes in the handwriting of an individual with postponed compulsory school attendance by one year shows greater errors than the joined-up nature and connectedness of various graphemes in the handwriting of an individual without postponed compulsory school attendance by one year.

Table 3

Handwriting size, proportionality and regularity, joined-up nature and connectedness versus postponed school attendance by one year by grades

variable	Mann-Whitney U Test (w / continuity correction) (Data Fasnerová.sta) By variable Odklad Marked tests are significant at p <,05000 Rank Sum A	Rank Sum N	U	Z	p-value	Z adjusted	p-value	Valid N A	Valid N N	2*1sided exact p
VP1	520,5000	4330,500	454,5000	-0,264475	0,791414	-0,29642	0,766912	11	87	0,789911
VP2	537,0000	4314,000	471,0000	-0,078780	0,937208	-0,08773	0,930089	11	87	0,938079
VP3	561,0000	4290,000	462,0000	0,180068	0,857099	0,20089	0,840787	11	87	0,859049
VP4	614,5000	4236,500	408,5000	0,782171	0,434115	0,85899	0,390347	11	87	0,435983
VP5	564,0000	4287,000	459,0000	0,213831	0,830679	0,23428	0,814767	11	87	0,832969
UM1	564,5000	4286,500	458,5000	0,219458	0,826293	0,24924	0,803172	11	87	0,824314
UM2	614,5000	4236,500	408,5000	0,782171	0,434115	0,86500	0,387038	11	87	0,435983
UM3	648,5000	4202,500	374,5000	1,164816	0,244094	1,28817	0,197688	11	87	0,245499
UM4	592,5000	4258,500	430,5000	0,534577	0,592942	0,58941	0,555588	11	87	0,593774
UM5	566,5000	4284,500	456,5000	0,241967	0,808806	0,26759	0,789015	11	87	0,807067
J1	511,5000	4339,500	445,5000	-0,365764	0,714542	-0,88079	0,378431	11	87	0,714035
J2	478,5000	4372,500	412,5000	-0,737154	0,461029	-1,29826	0,194199	11	87	0,462796
J3	467,5000	4383,500	401,5000	-0,860951	0,389266	-1,42042	0,155486	11	87	0,391223
J4	518,0000	4333,000	452,0000	-0,292611	0,769820	-0,34102	0,733089	11	87	0,772853
J5	527,0000	4324,000	461,0000	-0,191322	0,848273	-0,21857	0,826982	11	87	0,850338

Based on a statistical calculation according to the Mann-Whitney U-test and the Kendall's coefficient of concordance, it can be concluded that in terms of the joined-up nature and connectedness in the context of postponed school attendance by one year, there was no statistical significance by various grades (grade 1 to 5). In this case the null hypothesis H_0 is accepted and the alternative hypothesis H_A is rejected. The joined-up nature and connectedness of various graphemes in the handwriting of an individual with postponed school attendance by one year does not show greater errors than the joined-up nature and connectedness of various graphemes in the handwriting of an individual without postponed school attendance by one year.

The results of assessing the joined-up nature and connectedness of pupils' handwriting were very positive in relation to postponed school attendance by one year. The median oscillated around the value of 1. The boxplot was also around 1 in both assessed groups. In pupils without postponed school attendance the variance of respondents was around 1–3 but in pupils with postponed school attendance the variance was around 1. With a large degree of probability, the joined-up nature and connectedness does not present any problems in handwriting to primary school pupils, quite the contrary. In this category of assessment they achieved the best results. Also in this case it can be confirmed that postponed school attendance by one year clearly facilitates their readiness for school load.

Material hypothesis No. 2: Proportionality and regularity of various graphemes in the handwriting of an individual with postponed compulsory school attendance by one year shows greater errors than the joined-up nature and connectedness of various graphemes in the handwriting of an individual without postponed compulsory school attendance by one year.

Table 4

Handwriting inclination, density and rhythmization and neatness of written documents versus postponed school attendance by one year by grades

	Mann-Whitney U Test (w/ continuity correction) (Data Fasnerová.sta) By variable Odklad Marked tests are significant at p <,05000									
variable	Rank Sum A	Rank Sum N	U	Z	p-value	Z adjusted	p-value	Valid N A	Valid N N	2*1sided exact p
Sk1	554,0000	4297,000	469,0000	0,101288	0,919322	0,134144	0,893289	11	87	0,920438
Sk2	592,0000	4259,000	431,0000	0,528950	0,596840	0,683513	0,494283	11	87	0,601507
Sk3	510,0000	4341,000	444,0000	-0,382645	0,701983	-0,467439	0,640186	11	87	0,705757
Sk4	545,5000	4305,500	477,5000	0,005627	0,995510	0,006475	0,994834	11	87	0,991146
Sk5	542,5000	4308,500	476,5000	-0,016881	0,986531	-0,018901	0,984920	11	87	0,982292
H1	543,5000	4307,500	477,5000	-0,005627	0,995510	-0,006164	0,995082	11	87	0,991146
H2	457,5000	4295,500	402,5000	-0,379636	0,704216	-0,418850	0,675326	10	87	0,703986
H3	517,0000	4334,000	451,0000	-0,303865	0,761231	-0,340737	0,733302	11	87	0,764364
H4	548,0000	4303,000	475,0000	0,033763	0,973066	0,038984	0,968903	11	87	0,973441
H5	534,0000	4317,000	468,0000	-0,112543	0,910393	-0,129619	0,896868	11	87	0,911631
Upr1	553,5000	4297,500	469,5000	0,095661	0,923790	0,116024	0,907633	11	87	0,920438
Upr2	515,0000	4336,000	449,0000	-0,326374	0,744142	-0,381969	0,702484	11	87	0,747468
Upr3	589,0000	4262,000	434,0000	0,495188	0,620468	0,591314	0,554310	11	87	0,624966
Upr4	559,0000	4292,000	464,0000	0,157560	0,874804	0,183125	0,854700	11	87	0,876520
Upr5	538,0000	4313,000	472,0000	-0,067526	0,946163	-0,076989	0,938632	11	87	0,946911

Based on a statistical calculation according to the Mann-Whitney U-test and the Kendall's coefficient of concordance, it can be concluded that in terms of neatness of written documents in the context of postponed school attendance by one year, there was no statistical significance by various grades (grade 1 to 5). In this case the null hypothesis H_0 is accepted and the alternative hypothesis H_A is rejected. Again it can be stated that the median of the respondents' results was around the value of 2; the boxplot was rather between 1–2, both in individuals with postponed school attendance by one year and individuals without postponed school attendance by one year. Again it can be concluded that handwriting proportionality and regularity does not present any problems to the pupils. Again, after postponement of school attendance by one year the pupils are ready in terms of this category.

Material hypothesis No. 3: Individuals with postponed compulsory school attendance by one year report a higher degree of neatness of written documents than individuals without postponed compulsory school attendance by one year.

Table 5

Handwriting inclination, density and rhythmization and neatness of written documents versus postponed school attendance by one year by grades

	Mann-Whitney U Test (w/ continuity correction) (Data Fasnerová.sta) By variable Odklad Marked tests are significant at p <,05000									
variable	Rank Sum A	Rank Sum N	U	Z	p-value	Z adjusted	p-value	Valid N A	Valid N N	2*1sided exact p
Sk1	554,0000	4297,000	469,0000	0,101288	0,919322	0,134144	0,893289	11	87	0,920438
Sk2	592,0000	4259,000	431,0000	0,528950	0,596840	0,683513	0,494283	11	87	0,601507
Sk3	510,0000	4341,000	444,0000	-0,382645	0,701983	-0,467439	0,640186	11	87	0,705757
Sk4	545,5000	4305,500	477,5000	0,005627	0,995510	0,006475	0,994834	11	87	0,991146
Sk5	542,5000	4308,500	476,5000	-0,016881	0,986531	-0,018901	0,984920	11	87	0,982292
H1	543,5000	4307,500	477,5000	-0,005627	0,995510	-0,006164	0,995082	11	87	0,991146
H2	457,5000	4295,500	402,5000	-0,379636	0,704216	-0,418850	0,675326	10	87	0,703986
H3	517,0000	4334,000	451,0000	-0,303865	0,761231	-0,340737	0,733302	11	87	0,764364
H4	548,0000	4303,000	475,0000	0,033763	0,973066	0,038984	0,968903	11	87	0,973441
H5	534,0000	4317,000	468,0000	-0,112543	0,910393	-0,129619	0,896868	11	87	0,911631
Upr1	553,5000	4297,500	469,5000	0,095661	0,923790	0,116024	0,907633	11	87	0,920438
Upr2	515,0000	4336,000	449,0000	-0,326374	0,744142	-0,381969	0,702484	11	87	0,747468
Upr3	589,0000	4262,000	434,0000	0,495188	0,620468	0,591314	0,554310	11	87	0,624966
Upr4	559,0000	4292,000	464,0000	0,157560	0,874804	0,183125	0,854700	11	87	0,876520
Upr5	538,0000	4313,000	472,0000	-0,067526	0,946163	-0,076989	0,938632	11	87	0,946911

Based on a statistical calculation according to the Mann-Whitney U-test and the Kendall's coefficient of concordance, it can be concluded that in terms of neatness of written documents in the context of postponed school attendance by one year, there was no statistical significance by various grades (grade 1 to 5). In this case the null hypothesis H_0 is accepted and the alternative hypothesis H_A is rejected. Neatness of written documents of individuals with postponed school attendance is not dependent upon the grade of the pupil. Despite the fact that the results do not show statistical dependence, the median of the category of neatness of written documents of pupils in grades 1 to 5 has the value of 1. In grades 1 and 2 no differences in handwriting performance was observed. In grades 4 to 5 the boxplot of individuals with postponed school attendance by one year is between the values of 1 and 2, whereas the boxplot of individuals without postponed school attendance by one year is between 1 and 3. These results imply that postponed school attendance by one year clearly helps pupils in coping with school load.

Conclusion

As suggested by the above specified evidence of the hypotheses formulated in the research, we arrived at very interesting conclusions and findings. Our assumptions and generally accepted opinions about weak performance of pupils in primary school in the area of handwriting considerably deviating from the standard level have not been confirmed. We analysed joined-up linear handwriting from more perspectives, however, for the purposes of this paper we focused only on the assessment of selected quality-based categories with respect to postponed compulsory school attendance by one year.

In our research survey we verified our hypotheses using the STATISTICA 12 programme according to the Mann-Whitney U-test and the Kendall's coefficient of concordance as described in the methodology part. In most cases we accepted H_0, i. e. the null hypothesis because there were no significant differences in the statistically verified hypotheses.

The results of the research study imply that the joined-up nature and connectedness, proportionality and regularity and neatness of handwriting are not dependent upon postponed school attendance by one year. The fact that in some categories there is a statistically significant result, i. e. a problem for the pupils with training joined-up linear handwriting, has not been confirmed.

However, our assumption has been confirmed that the model of linear handwriting need not be changed because most primary school pupils are within the standard or slightly deviate from the standard. This suggests that the methods of teaching handwriting in basic schools according to the linear handwriting model need not be changed.

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Contact:
PhDr. Martina Fasnerová Ph.D.
Department of Primary and Pre-primary Education
Faculty of Education, Palacký University, Olomouc
Žižkovo nám. 5
779 00 Olomouc
Telephone: 00420-585 635 110
E-mail: martina.fasnerova@upol.cz