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Reading Literacy and Methods of Improving Reading

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***Abstract*—**The paper presents results of a research team from Faculty of Education, University of Hradec Králové in the Czech Republic. It introduces with the most reading methods used in the 1st classes of a primary school and presents results of a pilot research focused on mastering reading techniques and the quality of reading comprehension of pupils in the first half of a school year during training in teaching reading by an analytic-synthetic method and by a genetic method. These methods of practicing reading skills are the most used ones in the Czech Republic. During the school year 2015/16 there has been a measurement made of two groups of pupils of the 1st year and monitoring of quantitative and qualitative parameters of reading pupils' outputs by several methods. Both of these methods are based on different theoretical basis and each of them has a specific educational and methodical procedure. This contribution represents results during a piloting project and draws pilot conclusions which will be verified in the subsequent broader research at the end of the school year of the first class of primary school.

***Keywords*—**Analytic-synthetic method of reading, genetic method of reading, reading comprehension, reading literacy, reading methods, reading speed.

I. Introduction

THE Czech society views quality adoption and the use of the mother tongue as an essential feature of the level of general education. Jan Amos Comenius, an important personality in education, emphasized the importance of mastering the reading techniques for future employment and further education [1]. Therefore, the Czech Republic pays great attention to the development of initial reading.

With the help of a questionnaire survey implemented in 2014, we inquired what method of teaching reading and writing is the most popular in the first class of primary school in the Czech Republic. The online questionnaires were distributed and collected through social networks and e-mail boxes (614 questionnaires, i.e. 89% were collected). We found out that 70% of teachers in the Czech Republic use the analytic-synthetic method. This method has the oldest tradition in our country.

After a pilot test, the genetic method was approved by the Ministry of Education at the end of the 20th century. It is the second most widely used method in the country (12%) and is especially popular for enabling smooth transition from nursery school to first school year in practicing letters, sounds and reading (newly modified by Jarmila Wágnerová and Jitka Rubínová). Also a purely Czech method by Mária Navrátilová - Sfumato (6%) comes to the fore but is not going to be a part of the testing of pupils in the first term of the first year in primary school.

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II. Theoretical Basis

> "When comparing analytic-synthetic and genetic methods of reading, it is essential to follow from current psychological, pedagogical and linguistic knowledge. The main subjects of the comparison are: the process of familiarization with letters; ways of using scriptologic methods; the way of reading in which the methods result; the quality of texts compiled for the methods "[2].

Pupils distinguish a sound in a word by their hearing already in nursery school. A letter in then assigned to the singled-out sound. The Analytic-synthetic method (hereinafter AS) introduces students to all four letter shapes used in the Czech Republic at a time (Fig. 1). The method is based on uniting sounds into syllables and words. A child learns consonants (s, p, l, m, ..) and vowels (a, o, u, ..). From the letters he composes syllables and then words that he learns to read.

The genetic method according to Jarmila Wágnrová assigns only one shape to a letter and that is the capital letter (e.g. A). It stems from intuitive reading by spelling when a child spells a word and then repeats it as a whole (e.g: h-o-m-e -> home). Learning other letter shapes is based on the transfer principles. Gradual learning of the alphabet, the genetic (hereinafter GW) method uses, burdens memory less than parallel letter memorizing of the AS method [3].

A genetic method by Jitka Rubínová (hereinafter GR) has been also taught in the Czech Republic. It uses two shapes at once to form a sound – capital and low case block letters (e.g. A, a). Pupils learn the remaining two letter shapes later as in genetic methods according to Wágnerová [3].

Fig. 1 The four shapes of the letter A

It is interesting to compare different forms of the scriptolegic method. Reading and writing are closely linked activities and should be practiced concurrently. Learning reading by writing is called the scriptolegic method and it is used by the genetic method. In Germany, Sweden and Russia, 40% percent of teaching is done by the reading by writing method (but it follows from a slightly different basis than the

Czech genetic method) [4]. The Czech practice starts with reading and writing capital block letters. Children of pre-school age like block writing and try to imitate it. The AS method also substitutes writing by composing (into syllables, words). Both methods utilize the skriptolegic method, each a bit differently at its beginning.

> "An integral part of observing the difference between the two methods is also a comparison of the way reading is taught. The reading technique of both methods is based on the synthesis of phones which assumes the knowledge of letters for individual phones. Both methods, however, differ in the target unit of the synthesis of phones (speech sound). The analytic-synthetic method of reading has the syllable as the target unit, while the genetic method has the word "[2].

Discussing the *combination of mechanical and mental processes in reading*. Reading does not involve only the mastery of technique - mechanical process - but requires also a mental process that leads to comprehension. Understanding the meaning of what is read is an essential feature of reading and it is also its goal. It is possible to combine the processes only when reading meaningful texts. Thus, we can assume that the genetic method (GW and GR) combines the mechanical and mental processes earlier than the AS method. The synthesis of phones (phones technique) with subsequent global reading allows pupils to read whole words right after they know the letters. Reading by syllables in the AS method has its sense for elementary reading. Ultimately, the AS method produces a smaller number of fixations than reading by phones. Currently, Radana Metelková Svobodová is the one engaged in this topic in our country as she is monitoring the literacy of readers by using eyetracking [5].

III. Research Aims

The aim of the research is to compare the reading skills of first class primary school (hereinafter school) pupils acquired by different learning methods in the Czech Republic: the analytic-synthetic method, the genetic method according to Wágnerová (GW), the genetic method according to Rubínová (GR), and Sfumato, the newly-implemented method of learning to read by the confluent reading method by Marie Navrátilová.

The research consists of three stages. In the first one, we carry out and present here a pilot test of the reading skills of first class pupils in the school mid-year taught by the analytic-synthetic method, genetic method according to Wágnerová and genetic method by Rubínová. In the second and third stage at the end of the first class of primary school and in the first half of the second class we compare the reading skills of pupils on the same education level while we add pupils being taught by the confluent reading method - SFUMATO. The second and third stages are not included in this paper because the test of reading skills will yet be carried out or results are being processed.

In all the stages, our goal is to compare the reading performance quantitatively, reading speed per minute, and to compare the qualitative mastery of reading techniques, its accuracy (types of errors, double reading, expressiveness, fluency) and reading comprehension.

IV. Research Methodology

The test results were processed in the statistical program NCSS10. The Student's t-test, nonparametric Mann-Whitney test and Chi-square test.

In the Czech Republic, a standardized text from a standardized test of reading is the most commonly used for data collection. This text is used for diagnostics in pedagogical-psychological counselling centres to detect dyslexia [6], but it is already outdated and was primarily compiled for teaching by the AS method. The standardization of reading tests for genetic method and the Sfumato method has never been done.

We used a non-standardized reading test for first class primary school pupils, created for our research by Lenka Kazdová (five sentences with 22 words), to analyse reading skills with a focus on reading technique and reading comprehension. The text had to include the letters that the pupils knew from all the reading methods. Three pictures by the same author were a part of the text and a pupil was to choose which one captures the meaning of the text (or he came with own interpretation).

V. Research Sample

The research was conducted simultaneously in four first classes of primary school in February 2016. Analytical-synthetic method was tested in two classes with 39 pupils (marked as AS1, AS2). The genetic method by Rubínová (GR) was tested in 21 pupils. The last method tested was the genetic method by Wágnerová (GW) with a total of 20 students (Table I).

TABLE I
Number of Pupils

Method	Girls (number)	Boys (number)
analytic-synthetic (AS1)	12	7
analytic-synthetic (AS2)	10	10
genetic method by Rubínová (GR)	14	7
genetic method by Wágnerová (GW)	11	9

A total of 80 respondents were tested, 59% of girls and 41% of boys. Pupils at different ages attend first classes of primary school. The youngest respondents were 6 years and 7 months. Among the pupils there were also three children who were at least 8 years old. As expected, most pupils were seven years old (31%).

VI. Research Results

The analytic-synthetic method and genetic method were compared in terms of reading quality (mistakes, reading technique and comprehension) and quantity (speed). Due to the large scope of the research we analyse only some aspects in the paper.

We do not assume that the quantitative aspect of reading - speed is one of the most important for learning to read and the

subsequent comprehension. On the contrary, we see a situation where pupils learn fast reading but they have a problem s with comprehension. Still, we were interested in how fast pupils read the text using individual methods and what is the error rate. We were not concerned with the types of errors in this testing.

Pupils, who learned reading by the genetic method by Wágnerová, were able to read the most words in the first minute, 21 words in average. The GR method pupils read the least number of words in the first minute - 18 words. An important finding was the numer of correctly read words per minute in each class (Table II). When merging the both aspects, respondents who learned to read by the GW method performed the best.

TABLE II
AVERAGE NUMBER OF CORRECTLY READ WORDS PER MINUTE

Method	Read words (average)	Correctly read words (aver
AS	18.76	17.69
GR	18.04	17.33
GW	2.1	20.05

Changes in reading, in the second minute and further, could be caused by gradual deterioration or improvement of reading in time. The research results show that 22 pupils improved their reading in time and 27 pupils got worse. The GW method pupils improve their reading in time in most cases, the longer they read, the better the reading gets. On the contrary, the AS method shows the greatest deterioration over time, 54% of pupils were slower in reading (Table III) One GR method pupil, one GW method pupil and 8 AS method pupils were still reading the text in the second minute. Two pupils did not finish reading the text in the third minute (they were taught by the AS method).

TABLE III
CHANGE IN READING IN TIME

Method	Improvement in time (%)	Deterioration in time (%) (časerůměr)
AS	18.76	17.69
GR	18.04	17.33
GW	21.1	20.05

Regarding the speed of reading, respondents taught by the genetic method by Rubínová (Table IV) performed the best while the slowest readers were the ones taught by the AS method. We would like to add that a girl with a mild mental retardation taught by the analytic-synthetic method was the slowest in reading, she only spelled the text. We ask ourselves what is more important, faster reading or accurate reading? We are satisfied if a pupil masters the reading speed to the level of spoken word. Readig accuracy is fundamental to reading comprehention with a possibility of elaboration.

The average results for reading accuracy were surprising; the error rate was very low. In this aspect, the pupils taught by the genetic method by Rubínová proved to be the most successful. We observed the incidence of errors minute by minute. The error rate in the AS method and the GW method was only 5% in the first minute while the genetic method by Rubínová achieved the best result, only 4% error rate. In the second minute of reading, pupils taught by the GR method were by about 10-11% more successful than the GW and AS method pupils (Table V).

TABLE IV
AVERAGE READING LENGTH OF THE TEXT

Method	Average time in seconds	Shortest time in seconds	Longest time in seconds
GR	72.5	23	151
GW	85.3	23	204
AS	89.8	24	275

TABLE V
READING ACCURACY MINUTE BY MINUTE

Method	First minute (%)	Second minute (%) (časerůměr)	Third minute (%)
GR	**96**	**98**	**90**
AS	95	89	87
GW	95	87	83

Statistical testing (Student's t-test, Mann-Whitney U test) of the difference between the average reading length and the average number of correctly read words in each method (no statistically significant difference anticipated) was a part of the research. We had a null hypothesis for the testing. No statistically significant difference in the chosen significance level $\alpha = 0.05$ ($t_{krit} = 2.0860$; $t_{1,2} = 0.3033$; $Z_{1,2} = 0.7131$; $t_{1,3} = 1.4476$; $Z_{1,3} = -0.5766$; $t_{2,3} = 1.4599$, $Z_{2,3} = -1.6437$) was calculated. Furthermore, we did not anticipate statistically significant difference between the average number of correctly read words in the methods. Also in this case, no statistically significant difference in the chosen significance level $\alpha = 0.05$ ($t_{krit} = 2.0860$; $t_{1,2} = -1.9222$; $Z_{1,2} = 1.5296$; $t_{1,3} = -1.3161$; $Z_{1,3} = 0.9704$; $t_{2,3} = 1.0282$, $Z_{2,3} = -0.4882$) was proven.

Reading comprehension was the main purpose of the first diagnostic test reading. After reading the text, a pupil was to identify the picture which represented the content of the text. Respondents could choose from three pictures, only one was correct. The genetic method by Rubínová achieved the best results, 86% success rate. Pupils chose the right picture no. 2 or the picture no. 3. Interestingly, no pupil chose the picture no. 1. 10% of pupils picked the wrong picture but were also able to exchange it for the correct one (if we take such answers as the correct ones). In this perspective, the genetic method by Rubínová achieved 96% success rate (Table VI). The second most successful method was the AS method with 44% success rate. Here, pupils chose all three pictures and 4 pupils picked none. If we again take into account that 21% of the respondents changed the wrong picture for the right one and one respondent chose the right picture at first and went for the wrong one later, we get to 66% success rate for the analytic-synthetic method. In testing this method, we encountered four pupils who did not pick any of the pictures. In case of the genetic method by Wágnerová the results were clear. Only 35% of pupils picked the correct picture. The remaining 65% of pupils chose a wrong one. The last method then turned out to be the least suitable for teaching reading comprehension.

TABLE VI
FINAL CHOICE OF PICTURES REPRESENTING THE TEXT

Method	Correct picture (%)	Wrong picture (%) (rům ěr)	NO chosen picture (%)
AS	66	24	10
GW	35	65	0
GR	**96**	4	0

To complement the findings, we add the text the pupils read:

"My house is near a forest. My dad is celebrating his name day on Friday. I gave him a flower. Mam gave him a piece of salami, a belt and a jacket. The jacket had a pocket. "

(On the first picture is a dog walking on grass, a peace of salami in his mouth. On the second picture is a boy with a flower in his hand, wearing a jacket. The third picture shows a birthday package with a jacket, socks and a belt inside.)

Further, we tested whether statistical dependence exists between gender and text comprehension and the chosen reading method and text comprehension.

Dependence between gender and text comprehension was not proven through Chi-squared test ($p = 0.301$), but we found positive correlation between the method used and comprehension ($p = 0.002$).

VII. SUMMARY AND CONCLUSION

In the first diagnostic reading test we examined how 80 respondents in the first class of primary school manage different reading techniques of different methodologies (the analytic-synthetic method and the genetic method according to Wágnerová or Rubínová) and how they handle reading comprehension.

While examining reading speed minute by minute, we found out that the best readers were pupils taught by the genetic methods by Wágnerová. Moreover, 35% of them improved their reading in the second minute. Regarding the overall reading speed of the entire text, the pupils who learned to read of by the genetic method by Rubínová proved to be the best. Conversely, the analytic-synthetic method turned out to be the least successful as 54% of respondents worsened their reading in the second minute and 8 pupils out of 10 were still reading in the third minute.

It is difficult to judge reading techniques (double reading, spelling and syllabification) because each method stems from a different base. Persistent regression in reading will be more meaningful in the next research stage.

We were interested the most in how respondents would manage reading comprehension which was evaluated on the basis of pupils choosing the right picture for the content of the text. Respondents had the option to change a picture for another. In this aspect the pupils taught by the genetic method by Rubínová achieved the best results (96%); they also read the text the fastest. On the second place was the analytic-synthetic method where pupils read with caution, more slowly, but 66% of them chose the right picture. The statistically significant correlation between a reading method and text comprehension ($p = 0.002$) is interesting.

These results cannot establish a general conclusion. Each group of respondents in the sample has a different composition; we did not do preliminary background check of every respondent and the sample is small. Nevertheless, the results are interesting and can help to show the best way to teach elementary reading. We are in the first stage of the research; we will continue to monitor the respondents to see what their reading performance will be at the end of the first class and in the mid-year of the second class of primary school. In comparison with the studies [7], [5] we obtain similar results; the genetic method appears to be easier for pupils in the first phase of their reading practice. The genetic method by Rubínová has not been examined yet.

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