Orientation for Initial Introduction of Written Speech in Primary School

Yulia Solovieva[1*], Omar Torrado[1] and Luis Quintanar[1]

[1]*Department of Neuropsychological Diagnosis and Rehabilitation, Faculty of Psychology, Puebla Autonomous University, México.*

Authors' contributions

This work was carried out in collaboration between all authors. Author YS designed the study and author OT performed the statistical analysis. Author YS wrote the protocol and wrote the first draft of the manuscript. All authors together managed the analyses of the study. Author LQ managed the literature searches. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Reading at school traditionally is based on isolated training of this cognitive ability. Common methods are repetition, memorization and reproduction of given information. In public schools in Mexico, children never read entire books and only pages or paragraphs from the official programs. Even in private schools reading acquisition is a mechanic process, which starts from the first grade of pre-school age and continues up to the sixth grade of primary school. Cognitive tests measure the quantity of words read loudly in a minute with no attention to understanding of meaning. Alternative methods within active school and global reading can't solve this problem, because of luck of attention for orientation, analysis of content of actions and reflexive participation of the children in their own school actions. The aim of the article is to present an example of usage of orientation for initial introduction of reading process in primary school and to compare results of the method with results of traditional method of teaching. The method of introduction of reading and writing is based on psychological conception of orientation as essential element of activity. Reading

Corresponding author: E-mail: yulia.solovieva@correo.buap.mx;

process is analysed as symbolic codification and de-codification of oral words. The provide authors added detailed analysis of phonological and phonetic system of Spanish language. The method includes introduction of actions of codification at materialized, perceptual and verbal levels with gradual passing to reading of words and sentences. The program was applied in private primary school "Kepler" in the city of Puebla (Mexico) for six years. Results of assessment of reading and writing process in experimental and control groups of school children have shown significant differences favourable for experimental groups. Among strong advantages of the method is correct pronunciation of all known and unknown words in Spanish, usage of correct space between words in writing, reduced number of orthographic mistakes.

1. INTRODUCTION

Introduction of reading and writing at primary school represents one of the most important aspects of school education. However, there are no real intents for searching of new methods for initial introduction of reading and writing at school. Psychologists are able to detect different kinds of learning disabilities, which include strong difficulties in oral and internal reading and understanding of the meaning of words, sentences and texts. At the same time, identification of difficulties is not enough for construction of effective methods for overcoming of such difficulties. Frequently, children can read only well known and repeated words and phrases and are unable to pass to independent reading of books. Children never understand the difference between the level of concrete objects and oral words as symbolic level of intellectual analysis. Commonly used methods for introduction of initial reading are presentation of isolated letters, with which children have to conform syllables and latter words [1]. In very rare occasions isolated sounds are presented to children; some specialists propose to identify first and last sounds in the words as consolidation of phonological consciousness [2].

Educational system in Mexico, as in other countries of Latin America is facing strong difficulties, and teaching of reading in primary school is one of them. Strong difficulties in reading and in comprehension of texts persist up to high school and university levels. Total absence of motivation for conceptual and intellectual reading is only a part of these difficulties [3]. University students are unable to produce independent coherent written texts. Pupils at primary, secondary school and university level write only known memorized words and sentences, while independent production and profound understanding is always a great problem at school [4,5].

From psychological point of view, writing production and understanding of texts are essentially united. Nevertheless, cognitive theories study them as totally isolated functions with own brain structures involved in them [6,7,8]. Neuropsychological analysis of reading and writing permits detection of common functional brain mechanisms, which take part in both actions [9,10].

At the same time, the cases of children with difficulties as a result of absence of adequate methods for teaching at primary school are more frequent in comparison with children who have some kind of brain organic problems and/ or functional immaturity. It is very common to read in modern publications that the authors always claim to brain deficits of the children, but never to the deficits of pedagogical methods used by teaches at primary school [11]. Both possibilities should be taken into account during consideration of the reasons of children's difficulties.

Alternative method for initial introduction of reading and writing might be based on psychological activity theory applied to teaching and learning process. The method is based on structural psychological analysis of verbal actions and election of specific orientation for correct fulfillment of this action [12]. One of the ways for guided orientation might be introduction of reflexive phonological analysis in joint actions with the help symbolic materialized means [13,14].

From psychological point of view the period of school learning might be based on gradual formation of concepts by steps [12,15] instead of

traditional training of separate habits and abilities of pupils.

Quick reading without understanding and copy of words are claimed as highest achievements of learning process. The great mistake of constructivist pedagogy is poor understanding of social collective activity and pretention to wait for appearance of individual cognitive abilities in pupils or to facilitate this appearance [16,17].

Previous research has shown that success of methods of teaching and learning of children depends of the structure and content of provided orientation [18,19,20]. Specific orientation has to be created according to the content of knowledge or intellectual actions to be learned. The article shows an example of elaboration of such orientation for school children starting to learn reading and writing.

The main objective of our study is to show the possibilities and effectiveness of elaboration and application of such method for initial training of reading and writing in Spanish language in Mexican children in the first grade of primary school. The final results of application of the method were compared to those of children of same age and similar conditions of life included in traditional way of learning.

The article describes the process of formation of reading and writing abilities as fulfillment of joint intellectual actions by stages and presents qualitative results of children during implementation of different stages of the program. Results of comparison of success in reading and writing in experimental and control groups are presented.

2. METHODS

The method for introduction for reading and writing [21] is based on general psychological positions of activity theory applied to teaching and learning process. Such positions imply necessity of detailed analysis of the whole structure and content of the process. In our case, the process is initial introduction of reading and writing, so that detailed analysis at different levels was provided: phonological level of Spanish language, analysis of stages of introduction, kinds of orientation, usage of symbolic means and joint teacher-pupil participation [12,15,21].

The method for teaching of reading was created on the bases of the former proposal of Elkonin [22] elaborated for Russian language and modified according to detailed analysis of phonological features of Spanish language and to necessities of pedagogical work with Mexican children in primary school.

These modifications, all based on activity theory approach, might be resumed as follows:

1) consideration of phonological features of sounds in Spanish language: types of consonants;
2) types of co-relation between verbal sounds and letters used in Spanish language, where seven kinds of relations were identified [21];
3) necessity of special work not only with reading and writing but also with drawing of images as a previous ability with children of the first year of school education [23,24];
4) necessity of constant stressing and verification of order of sounds on oral level, during introduction of symbols for verbal sounds and later of letters on the level of written language;
5) taking into account frequent difficulties and confusions of children while learning Spanish written language in primary school obtained from previous research and constant practice in neuropsychological assessment [25].

2.1 The content of the Method

The methodology of introduction of written language implies fulfilment of joint actions of children guided by teacher. Joint way of teaching in groups is one of the most important features of all methods created on the basis of activity theory and cultural historical psychology. On each stage, teacher shows children what and how to do and helps in cases of difficulties [13,15]. Children are always encouraged to ask questions, to help each other to correct mistakes or to put examples of words and sounds. All kinds of initiative and interest of children are taken into account by teacher. All tasks are shared in the group and are fulfilled collectively together with the teacher. The teacher takes part as another mate of the children and as a guided of intellectual activity. Collective dialogue is the main kind of interaction and children are free to move from place to place in the classroom. All mentioned features correspond to the concept of

orientation, which is one of the central concepts of activity theory allied to learning and teaching joint process [14,21].

At the first stage, the actions of children represent reflexive analysis of phonological structure of sounds within oral pronunciation of words. Children start with general identification of the quantity of sounds in each pronounced Spanish word. On the next stage, external schemes are represented in order to offer external codification of oral words. All tasks are interactive and the analysis of words occurs in the whole group. Double consonants typical for Spanish language and specific order for introduction of letters according to the kind of correspondence between sound and graphic representation (letter/ consonant relation) are taken into account as a content for reflexive orientation. The teacher may propose and organize different intellectual creative games and competitions while working with the Program for initial introduction of written language.

Later on, the schemes for words are filled with symbols for vowels and consonants with consecutive representation of details of differentiation. In the case of vowels, children learn to identify stressed and unstressed vowels; in the case of consonants, children learn to identify short, long, mild and grave sounds. For each differentiation, special external symbols are used. The stage of materialized actions of analysis of sounds in words is followed by perceptual stage, on which children draw the schemes with all learned symbolization in the notebooks.

The last stage implies gradual introduction of letters for representation of sounds and types of relations between sounds and letter in Spanish language. After this stage children are able to pass to independent reading and writing of sentences and short texts.

2.2 Stages of the Method with Correspondent Examples of Children's Tasks

1. Oral phonetic analysis of sounds in words. On this stage children say loudly different words they like. The teacher helps children to identify orally the sounds in each pronounced word.
2. Phonetic analysis with the help of external materialized action. On this stage, the teacher shows the scheme for words, in which the quantity of squares correspondents to quantity of sounds in the word. Children choses correspondent scheme according to the quantity of sounds and fill the schemes with the circles in correspondent places.
3. Introduction of general phonological differentiation of vowels and consonants. The vowels are symbolized as red circles, while the consonant sounds as green circles in external schemes.

During the work with the Method, the teacher directs all executions of the children. The elaboration and the work with external scheme of the word served as orientation for the action of phonologic analysis of the words in Spanish. Initially, the teacher presented only known words, later on new words are presented gradually to the children. The children started to pronounce more words and to give own examples of different categories of words: for objects and subjects, actions, characteristics, number, proper names and so on. All kind of grammar categories is included for analysis according to initiative and interest of the children or specific "topic of the day" chosen by them. Examples of such topics might be: animals, town, our names, our parent's professions, means of transports, our house, etc.

At the first stage, the child pronounced the word with help of an adult and tried to fill the presence of different kind of sound in the words. At the stage of materialized action, the child has to learn not only to notice the real existence of sounds in the words, but also to determine the quantity of sounds in each word and to represent it with the help of the scheme. Example 1 shows example of materialized scheme of the word *"pato" (duck).* In Spanish, this word consists of 4 sounds.

Later on, the white circle is placed on the scheme. At this stage, the child doesn't know types of sounds, neither names of letter, but he/she learns to perceive the order and the structure of every word. Example 2 shows the scheme of the word with white circles for determination of the sounds of the word.

Gradually, always with the help of orientation of an adult, the child learns to differentiate the types of sounds: vowels and consonants. The child has to substitute the white circle by red (for vowels) or green circle (for consonants) in the scheme of the word. Example 3 shows the scheme for the word, which consists of five sounds in Spanish:

two vowels and three consonants. Children use correspondent circles with colors for identification of vowels and for consonant sound in the words.
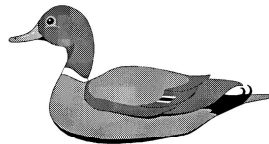
The children also learn to discriminate stressed and non-stressed vowels in the words. The special external "stress" is used in the schemes.
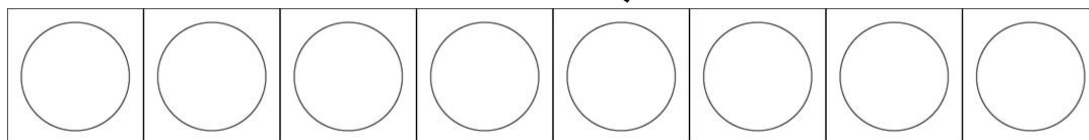
Example 1.
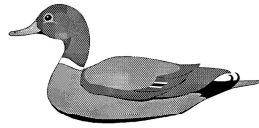
Example 2.

Example 3.

Example 4 shows the scheme for Word "elefante (elephant), which consists of eight sounds.

On the next stage the child has to fill and to determine the soft sound *"Ñ"* in comparison with oral sound *"N"*. The teacher has to give examples of the words with these s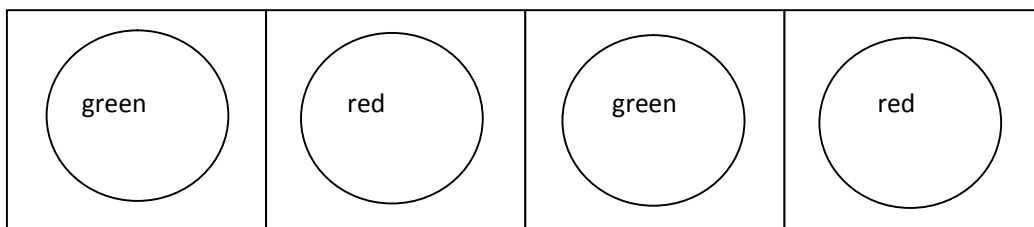ounds and to stress the difference in their meaning. These differences are marked in external schemes of the words. Example 5 shows the scheme of the word *"mono"* (monkey) which consists of four sounds.

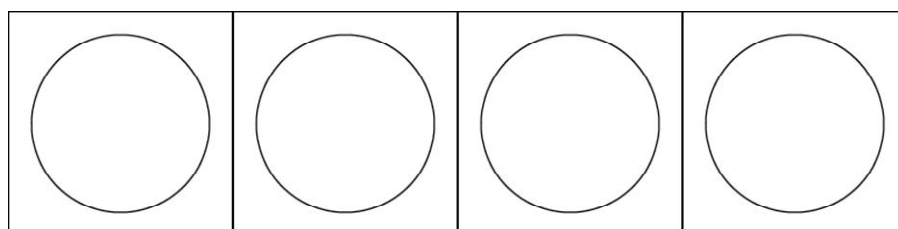Example 6 shows the scheme for the word "moño" (bow).

Example 4.

Example 5.

| green | red | green | red |

Example 6.

Another important phonematic characteristic in Spanish is differentiation of long consonant sound *"RR"* and short consonant sound *"R".* Such differentiation permits to recognize properly the meaning of words. The teacher or therapist gives the examples of such words and the child learns to differentiate these sounds by marking it with two little green circles or one green circle as for any consonant sound.

Very common example of these discrimination are the words "perra" (dog) and "pera" (pear). In order to differentiate these two words in Spanish it is necessary to perceive the difference between long and sort sound. Children are confused in this situation very often and commit mistakes in their writing. Example 7 shows the scheme for the word "perra" (dog).

Example 8 shows the scheme for the word "pera" (pear). The work with the external scheme permits the children to feel the difference between the structures of the sounds inside the words. Such work converts later on in the orientation for the process of writing.

After the work for some months on external stage of materialized actions with the orientation of scheme of the words, the teacher may pass to the stage of perceptive actions or graphic stage. On graphic stage the child fulfils the same kind of tasks. The difference is that instead of elaboration of material schemes, the child has to draw the schemes and the circles with correspondent colors. The green color is used for consonant sounds, while the red color is used for vowel sound. Example 9 shows the scheme for the words "chango" (monkey) and "bandera" (flag). These examples are taken from real pupil's notebook.

After a lot of practice, letters are gradually introduced on the next stage: first, for vowels and later for consonants. Example 10 shows examples from the pupil's notebook.

Finally, the child learns to read and write the words with all conventional letter of Spanish alphabet. The scheme is eliminated on the last stage of the work with the method. The children start to write sentences and even short texts. The examples show written answers to the question about the content of the tale of H.Ch. Andersen. Example 11 shows the text written by the pupil of our school in the month of May (end of the first school year of primary school). The age of the pupil is 6 year and 7 months.
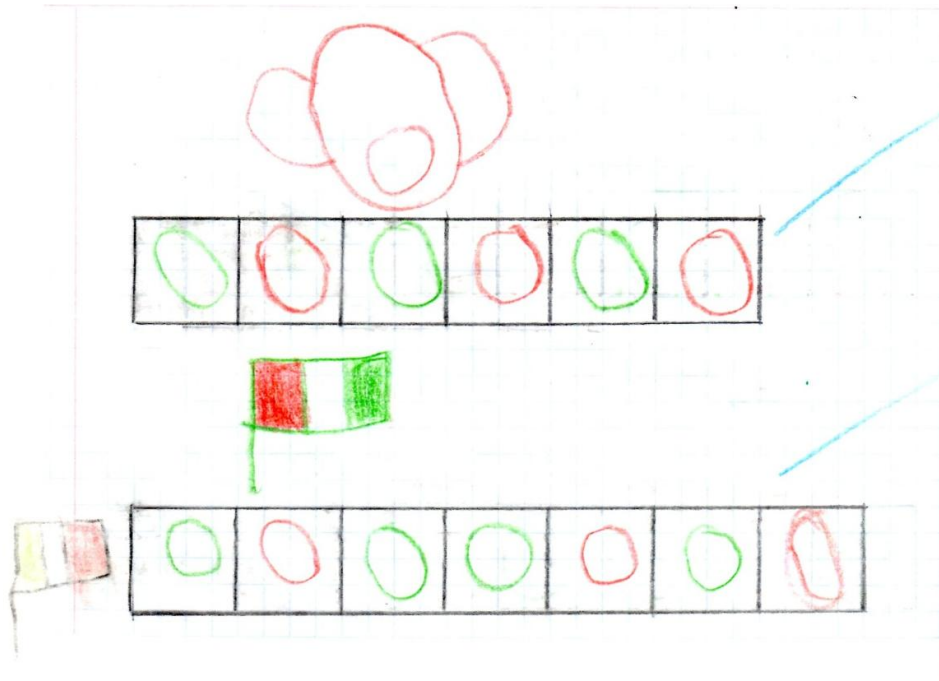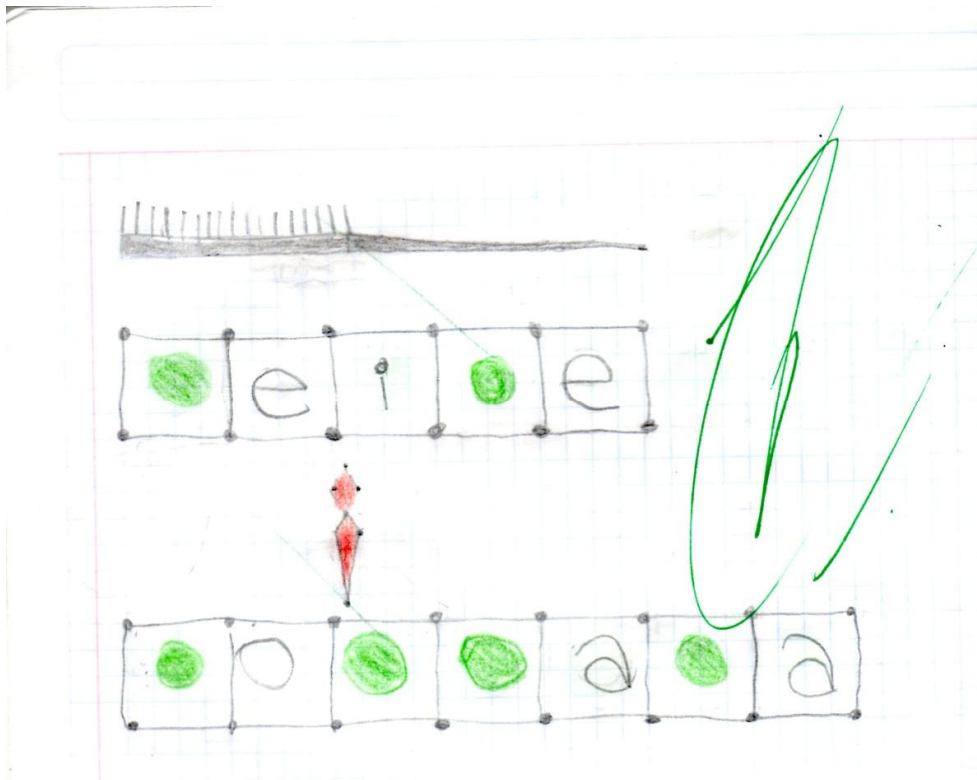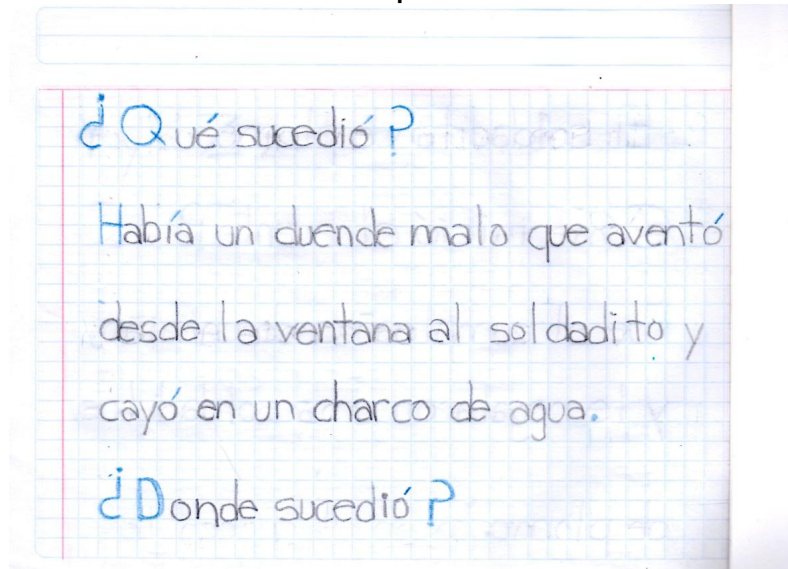
Example 7.
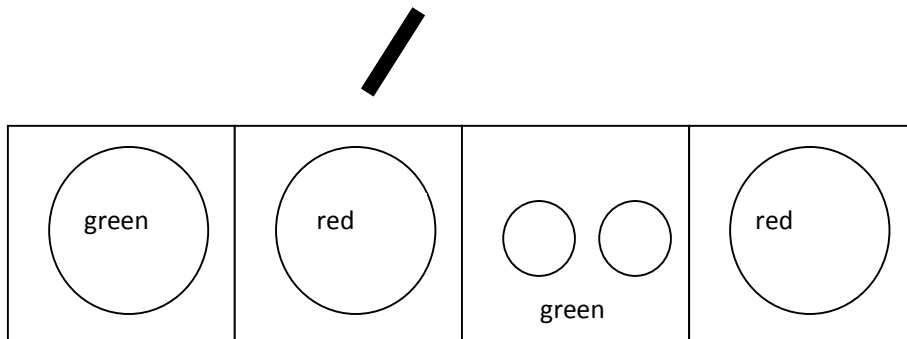
Example 8.
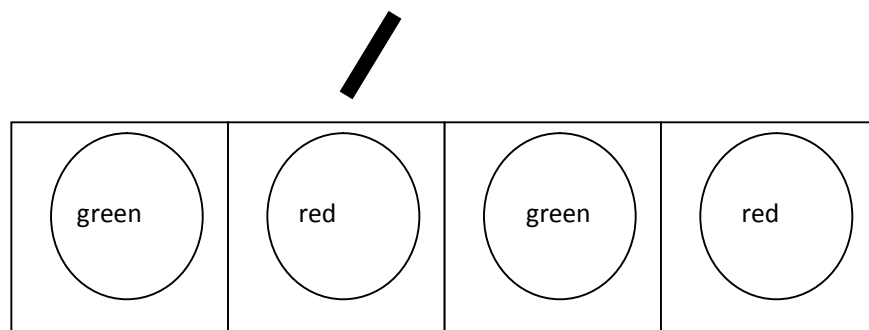
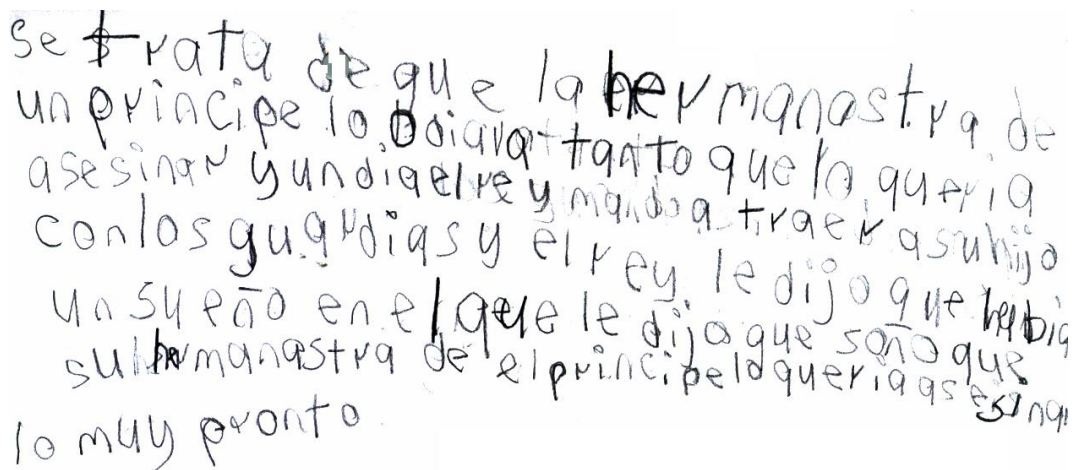**Example 9. Representation of the Word in the notebook**

Example 10.

Example 11.

Example 12.

Example 12 shows an example of writing of the pupil of regular school, where traditional method of teaching was used. We may find a lot of mistakes and difficulties with distribution of space, omission and substitution of letters, wrong separation and union of words, difficulties for the usage of the base line, absence of capital letters and of sings of punctuation. It is very difficult to read this writing, and the child can't read it at all.

3. RESULTS OF ASSESSMENT OF WRITING AND READING IN CONTROL AND EXPERIMENTAL GROUPS

In order to evaluate the effects of the method on writing and reading process, abilities of children included into experimental program were compared to the children from control group who learned by traditional method.

The children from both groups were assessed at the beginning of the third year of primary school, one year after they learned to read and to write sentences and texts. Five children were included from experimental group and eight children from the control group. Children from control group were taught according to analytic-synthetic method, which is popular and commonly used in Latin America for introduction of reading and writing. Experimental and control groups belonged to similar social and economic level (middle urban class) and assisted to small

private primary schools. Both schools have similar conditions in relation to the structural level and pedagogical resources. Both schools included small number of children per classrooms (maximum of 10 pupils). Table 1 describes the main demographic characteristics of the sample.

Table 1. Demographic data of the sample

	Experimental group	Control group
Boys	4	5
Girls	1	3
Average age	8.14	7.9
SD	0.38	0.33
Right-handed	5	7
Left-handed	0	1

The tasks used during the evaluation are conform the part of the scheme for Neuropsychological Evaluation of School Success. The Scheme is an instrument of interactive qualitative assessment of tasks for oral and written verbal production and understanding.

Table 2. Reading and writing tasks that make up the instrument of neuropsychological evaluation of school success

Section	Tasks
Writing	1. Copy and letters denomination 2. Word writing 3. Complete sentences to dictation 4. Sentences Dictation 5. Copy and read of words 6. Copy and read of sentences 7. Independent writing (nouns) 8. Independent writing (narration)
Reading	1. Reading: la gallina de los huevos de oro 2. Reading: el cuervo y las palomas

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Analysis of results of the work with the protocol consisted in identification of specific mistakes in both groups. Table 3 shows typical types of errors of the children found in reading and writing tasks in each task.

Table 3. Typical errors in each task

| Error	Task
Substitution of letters Substitution of words Disrespect to punctuation Repetitions Pause between syllables Pause between words Absence of prosody	Reading
Addition of letters	Copy Independent writing Dictation
Addition of words	Reading Copy Independent writing Dictation
Omission of letters	Reading Copy Independent writing Dictation
Omission of syllables	Reading Copy Independent writing Dictation
Omission of words	Reading Copy Independent writing Dictation
Addition of syllables	Copy Independent writing Dictation
Homophonic orthographic errors	Copy Independent writing Dictation
Heterophonic Orthographic Errors	Copy Independent writing Dictation
Visuospatial substitutions	Copy Independent writing Dictation
Omission of Accents	Copy Independent writing Dictation
Omission of Punctuation	Copy Dictation Independent writing
Disrespect of Capitals	Copy Dictation Independent writing
Separate Words	Copy Independent writing Dictation
Match Words	Copy Independent writing Dictation
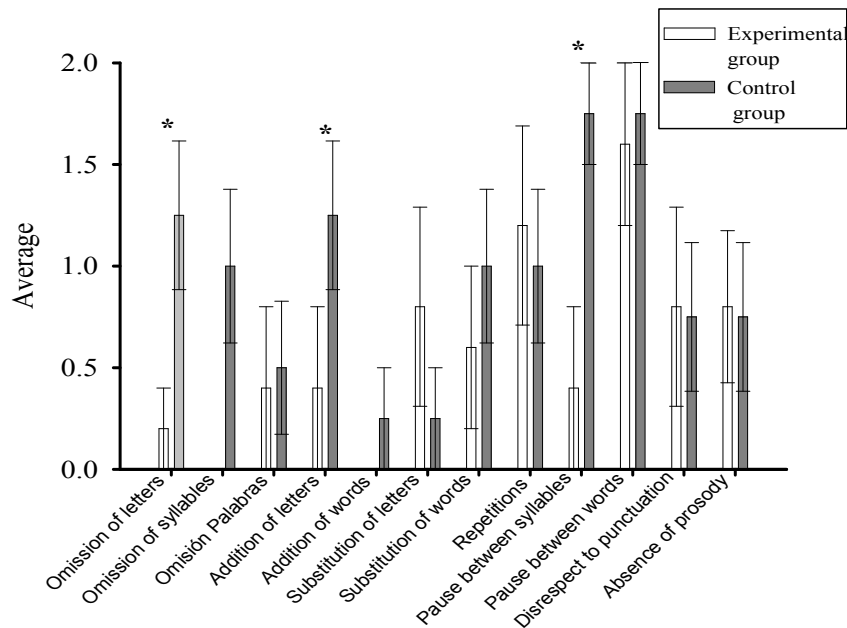
Fig. 1. Results obtained in reading tasks in both groups
Note. The statistically significant difference is shown in bold

Statistic analysis of reading tasks permitted to identify significant differences between the groups favorable for experimental group for the following kinds of mistakes: 1) omission of letters (p=<0.05), 2) addition of letters (p=<0.05) and 3) pauses between syllables in words during reading (p=<0.01) (Fig. 1).

Assessment of meaning and sense of texts read by children was carried out by score of points 0, 1 or 2. Point 0 corresponded to successful comprehension; point 1 to auto-correction of mistakes in comprehension of the meaning and point 2 in cases of absence of comprehension. The results were favorable to children from experimental as they committed less mistakes in understanding of meaning of texts (Md = 1.3 in experimental group and Md = .15 in control group; U = 8, z = -2.01, p = 0.022).

It is also possible to find less quantity of mistakes in omission of signs of punctuation (pauses and expression during loud reading of texts) in experimental group in comparison with control group (p=<0.05) and of reading of sentences (p=<0.05).

The Fig. 2 shows the errors of children during fulfilment of the task of coping of sentences.

Example 13 shows the task of copy of the sentences by children from both groups.

Omission of the point sing in the sentence might be observed in the execution of the pupil from control group. Some difficulties with distribution of writing is observed in the same example. Better general hand writing ability is observed in the execution of the pupil form control group.

The Fig. 3 shows the results obtained in the dictation tasks in both groups. It is possible to identify statistically significant differences between the groups. The differences are favorable to experimental group in the case of mistakes of addition of words (p = <0.05), omission of letters (p = <0.05), omission of syllables (p = <0.05), omission of punctuation (p = <0.05) p = <0.05), separation of words (p = <0.01) and matching words (p = <0.05) (Fig. 3).

Example 14 shows the task of writing by dictation in pupils from both groups. It is important to stress that some kinds of mistakes were found in both groups during dictation: homophonic orthographic errors, omission of letters and omission of orthographic accents. However, heterophonic orthographic errors, absence of capital letters, omission of punctuation and incorrect union of words were found only in control group. The sentences with better distribution of the text on graphic space were observed in the writing of children from control group.
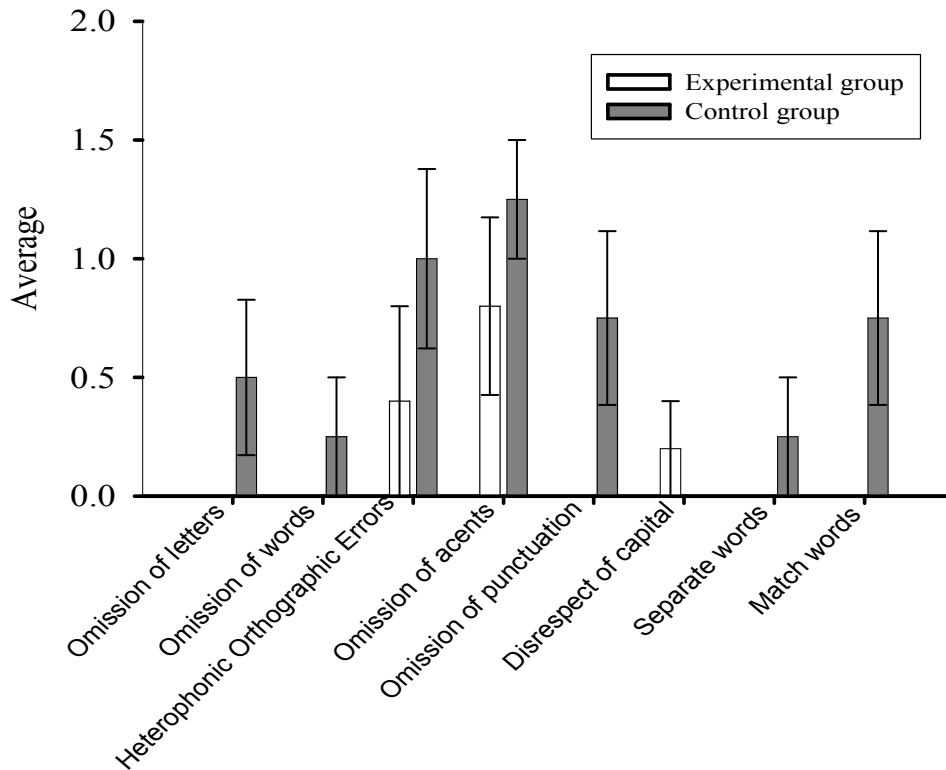
Fig. 2. Results obtained by both groups in writing tasks of copy

Example 13. Examples of executions in copy

Model of sentences for copy

En el parque crecen árboles grandes.
El cielo de noche se llena de estrellas.
La maestra explicó una regla nueva.
Nuestro tío vendrá durante las vacaciones.
El chofer lavó el carro con agua y jabón.
Experimental group

Control group

Note. The identified errors are highlighted with a low script

The Fig. 4 presents results obtained during comparison of the task of independent writing. It shows significant differences between the groups related to mistakes of omission of letters (p=0.05) and heterophonic orthographic errors (p=0.05) (Fig. 4).

Example 15 shows the task of the independent writing by pupils from both groups. It is possible to find different mistakes in both groups such as substitution of letters, omission of accents, union of words, omission of signs of punctuation and homophonic and hetero-phonic orthographic errors. At the same time, absence of capital letters, omission and wrong separation of letters in words only occur in control group.
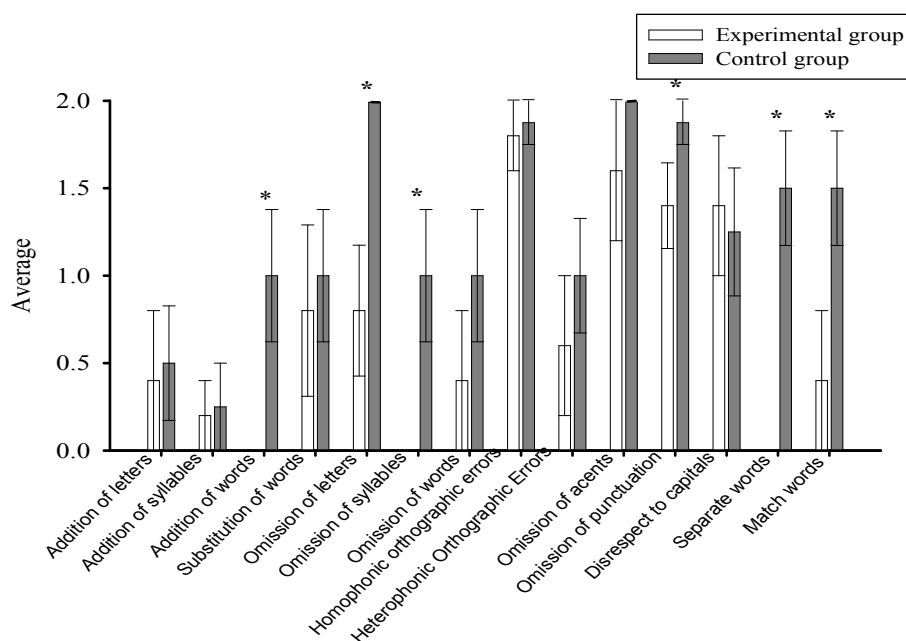

Fig. 3. Results obtained by both groups in writing tasks of dictation

Example 14. Examples of tasks of dictation

Dictated sentences

En el mar se ven los barcos.
Los niños van a la escuela por la mañana.
La señora compró un par de zapatos.
Víctor se pone el saco y se va a trabajar.
Los perros son amigos del hombre.

Experimental group

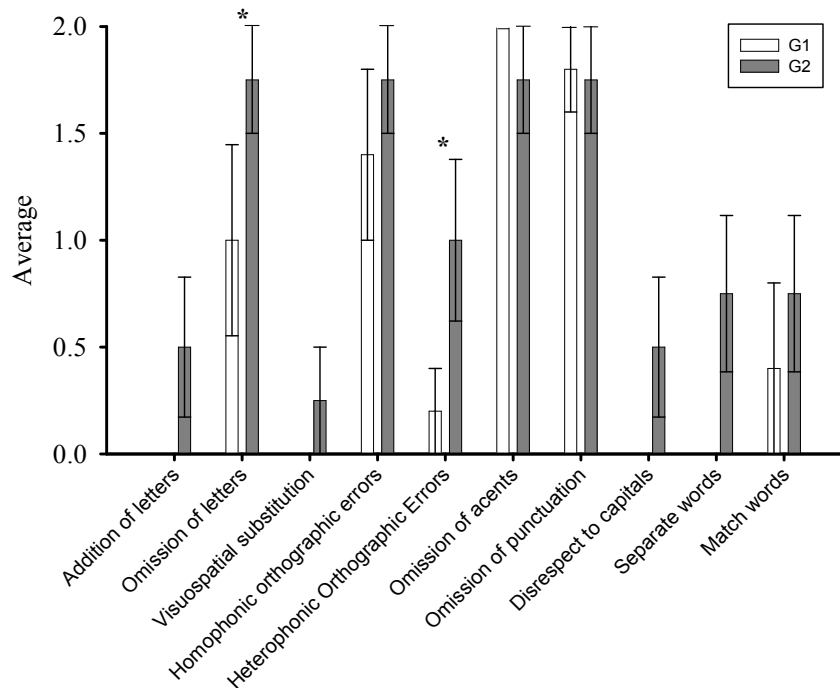**Control group**

Note. Identified errors are highlighted with a low script

**Fig. 4. Results obtained by both groups in the tasks of independent writing
Example 15. Independent writing**

Experimental group

Control group

Note. Identified errors are highlighted with a low script

4. DISCUSSION

Pedagogical work with the method permitted to establish essential advantages of proposed Method for introduction of reading and writing. The children from experimental group managed to form general linguistic abilities such as understanding of the difference between the level of oral speech and the level of graphic symbolic representation of this oral speech. Such symbolic representation is required for proper acquisition of written language [22]. After introduction of initial action of codification and de-codification, it would be possible to work with establishment and choosing of intellectual hypothesis during reading process according to Luria [9] who wrote that reading should be understood not only as the process of codification, but also as a kind of intellectual activity of interaction with the content of written language.

The results obtained as the consequence of the usage of the method show achievements in reading, writing and general linguistic abilities after application of the method during the first year of primary school. Results were stable till the third grade of primary school, as it was shown during comparison with control group.

After working with the method, at the end of the first year of primary school, children can write independently words and sentences and even short texts. Their reading was fluent with good pronunciation and appropriate stressing of the

words. Children never pronounced syllables or letter separately. Such separation during loud reading are typical in Mexican primary schools frequently not only in primary, but also till the beginning of secondary school. Traditional analytic synthetic method implies analysis of isolated letters and syllables as independent unities. As the consequence, the pupils always show difficulties for understanding of the rules and necessities of flexible union of these elements in words. The pupils may only perceive the sounds of letters for vocals and never perceive consonant sounds [1].

As for writing, the children from experimental group were able to write independently words and sentences with low quantity of mistakes in comparison with writing of children from control group. After working with our method, children always notice limits of written words and separate them correctly on the paper. Such proper orientation on graphic level of written space was achieved by representation of objects by drawing, very useful before introduction into written production [26].

Results of assessment allowed to discover stable abilities of writing in general. Children were able to respect the base line and the limits of words and sentences. Mistakes with omission and confusion of letters are very rare in comparison with mistakes of children from control group. Children commit less quantity of orthographic mistakes in cases when phonological analysis

might be applied or when the words have different pronunciation. Specific cases of such common mistakes are confusion of letters "g" and "j" after vowels "a", "u", "o" and confusions of letters "c", "q", "k", "s" after vowels. These cases are especially difficult in Spanish language, and children commonly commit such mistakes during a long time. Our method of orientation in the usage of these letters after vowels and differentiation of the level of sounds and letters help a lot to understand different kinds of relations between sounds and letter in Spanish.

The children form experimental group could conform general linguistics abilities. Phonological analysis of words of Spanish language was formed as reflective and voluntary action. Children became able to notice that the quantity of sounds don't correspond to the quantity of letters.

According to all exposed, we find it useful to introduce conceptual knowledge about language structure in primary school. Such introduction might be helpful for introduction of initial reading and writing at school. Teachers in traditional schools don't imagine that such conceptual linguistic knowledge might be important for children at the very beginning of school learning [27]. Reflexive theoretical knowledge about level of analysis of oral and written language never appears even in secondary schools. Constant repetition and memorization of the rules take place instead of reflexive active analysis of linguistic phenomenon [28]. One of the consequences of such situation is poor level of written production and understanding of professional texts at university level.

After working with our method, all children have developed conceptual linguistic knowledge:

1) Sounds and letters represent different level of analysis of words. The quantity of sounds doesn't correspond to the quantity of letters.
2) Sounds might be divided in different groups: vowels and consonants. Consonant sounds may differ according to pronunciation (long – short; soft – hard).
3) The words consist of different quantity of sounds; different quantity of vowels and consonants.
4) Sounds have special place and order in the words.
5) It is possible to change the words (meaning) by changing the sounds.

Important achievements were noticed in reading and writing of all children. Positive characteristics of the reading process were the following:

1) The children never read by syllables, but were able to pronounce correctly whole words in all occasions from the very beginning.
2) The children never committed mistakes of confusion between letters, omission of sounds or sound anticipations in the words.
3) The children were able to read sentences and short text corresponding to their age with good comprehension at the end of the work with the method.

In the process of writing the positive results were:

1) The children were able to separate accurately one word from another in their writing.
2) Children made correct separations between words in their writing.
3) There were practically no omissions of letters in their writing.
4) A considerable number of common orthographic mistakes in Spanish language were overcome with the help of the Method (confusion between "N" and "Ñ", confusion between "R" and "RR", wrong usage of special cases with letters "G", "C", "K", "Q" and others). The work on introduction of specific rules for sound-letter correlation forms an important part of the method (this part of the Method was not included in the present report).

As additional result, children showed high cognitive motivation and interest to verbal phenomenon and intellectual actions with words. During the work in groups, it was possible to use other kind of creative activities with children, such as play "guess the word", "change the word by changing first sound (second / third/ last sound). Collective analysis of long complex words was also introduced. Children were interested to give variety of own examples and were able to control and correct own tasks. High cognitive motivation permitted introduction of profound analysis of meaning and sense of stories and short novel for children with good understanding. Children were eager to read books independently, which rarely happen in traditional Mexican schools.

The teachers who work with proposed Method in primary school has expressed notable differences between possibilities of this group and other children who were learning by traditional (analytic or global) training of reading.

5. CONCLUSIONS

Results of our research show broad possibilities of creation of new methods for teaching at school according to theoretic and methodological positions of activity theory and historical and cultural psychology. Positive effects of proposed method for initial introduction of reading and writing were found during final assessment of children from experimental group in comparison to those from control group.

The authors are sure that the main starting point of our Method is usage of specific orientation for oral and written analysis of words. Such orientation, introduced from external level by joint collective actions between teacher and children permitted the passage to independent verbal actions of analysis and production of words and sentences. Introduction of new methods elaborated according to theoretical and methodological proposals of inclusion of guided external orientation could be very useful and productive. Specific orientations might be created for correction in cases of learning disabilities and prevent mistakes of confusion, inversion, omission, wrong separation and anticipation in reading and writing.

Activity theory applied to methodology of teaching might help to overcome common problems of learning at school. The concept of orientation should be understood by teachers and psychologists in a concrete way and used during creation and introduction of new methods of interactions at primary school.

Our present results encourage us to continuation and creation of new methods for other matter in primary school.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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