

THE VISUAL-MOTOR COORDINATION-BASIC COMPONENT IN LEARNING WRITING IN PRIMARY SCHOOL

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Abstract: *One of the main activities of the first grades of primary education, is learning writing and reading. To write correctly, the children need a perception sufficiently developed to capture details, visual-motor coordination between hand and eye in order to reproduce in the notebook the signs that are drawn on the board or book. The author presents her results on one sample of children from the primary school, to whom she tried to improve the visual-motor coordination by didactic games. The decrease in average frequency of errors is the result of a better hand-eye coordination of the children, because the games we have used and whose effectiveness can not be denied. Our results, allow us to say that the working hypothesis proposed at the beginning of the experiment has been confirmed by the practical results.*

Keywords: *learning writing, visual-motor coordination, primary school children,*

Theoretical frame

Entering school is an exciting moment in education and child development. This moment requires meeting certain standards of physical and mental development, but requires also, from the child a higher ability to adapt to new, given that the school environment is completely new and requires compliance with certain rules and regulations.

Learning reading and writing begins at the age of 6-7 years. At this age, typically, the child has spatial representations of shape, size, spatial orientation, spatial-temporal structure and has the motor maturity necessary for coordination in the specific movements of writing graphic signs, so he has the potential for learning the writing. The development of the child thinking is reflected in the use of some forms of memory. At this age occur symptoms of voluntary attention. Thus, pupils listen attentively to the teacher's explanation on how to do an action. They can control their own actions subordinating them to a purpose, more or less close. Their emotional

states are deeper and richer in content. They develop some feelings like: the feeling of friendship, intellectual and aesthetic feelings. All this does not happen by itself, but under the influence of education and instruction.

The entry into the school environment requires a certain level of development of mental processes: to focus on the lesson, to develop the spirit of observation, of voluntary memory, to develop the thinking. Even in the first days of school, the child must undergo precise requirements as: to control his behavior, to express himself properly, to control his movements, to observe certain rules of conduct.

Acquiring and appropriating writing child will win a new way of communication: that via written language. Associated to writing, the reading will develop fully this new form of communication, helping children to broaden their horizons and gain new knowledge.

In the first grade writing is a voluntary activity. The child makes a volunteer effort to write each part of a letter that he verbalises (stick, oval, dash etc.). Subsequently, by continuous practice, writing will become an automatism and even the rules of good writing can become automatism. In this respect, it is very important to teach writing correctly from the first purchase. As all psychologists say, a habit is easier to mold it correctly than to correct a wrong habit formed.

The writing is essential in human life and its evolution. From notes that students take in school notebooks, to the exams to be given, to reports by institutions, everything is based on the use of the written language and preferably written language as correctly.

This period is under the influence of school learning (Ilica, 2006). General motor activity develops under the influence of physical education activities, are developing the mobility of small muscle practiced also by writing activities. Visual perceptions are heavily involved in reading and writing and therefore is characterized by:

- *general visual sensitivity* increased by 60% compared to pre-school and 45% of the differential sensitivity. Under these conditions, perceptions become clearer and more precise: starting with the age of 6, children can quickly determine symmetries and asymmetries in the images they perceive; when they learn to read and write, they perceive with finesse the graphical signs small dimensions, the differences between letters; by targeting the small spaces are formed the perceptive schemes for small and large letters, handwritten and printed, with dexterity (Gavrilă-Ardelean, M. Gavrilă-Ardelean, L., 2015);

- *eye movements* - increase in terms of speed, up to 1-3 hundredths of a second. In the act of reading, eye movements achieved the following: fixing the letters and syllables that are pronounced then; anticipation of what will follow through better functioning of the peripheral field of vision; regression,

ie return to those already read for control and wholeness of meanings; crossing from one place to another (this passage is at first carried out by tracking his finger on letters);

At the age of 6-7 years, there is a widening of peripheral and central visual field, increasing the accuracy in distinguishing chromatic nuances (Cucos, 2000).

At the hearing analyzer, increase self-speech capability and can be considered the distance between objects by sounds and noise they produce. Perceptions are shaped by demands of the learning activity. Syncretism (the whole perception) decreases in at the small schoolchild by increasing of the perceptual acuity relative to the perceived object. Distances perceived by the child grow and produce generalizations of spatial direction (right, left, forward, backward); it appears the topographical sense. Spatial perception retains a touch of situation (for example the difficulty in recognizing certain geometric construction whose position has been changed) (Gavrilă-Ardelean, M. Gavrilă-Ardelean, L., 2015).

If at the entry into school representations are confusing, less systematized under the learning action, representations widen, getting rich and diversified. The child manages to break down the representation into its component parts which they recombine, creating new images. Thus, in the individual experience enter information and knowledge about the phenomena and objects that have not been directly charged. It occurs also an increase in the degree of generality of the representation. All these are human specific traits and are part of indirect knowledge (Schwartz, Kelemen, Moldovan, 2007). Tactile perceptions become finer, getting rich and starting to be trained in writing. Although in the beginning, the pupil (first the one who did not attend kindergarten) is under the sway of gum, deleting repeatedly what he wrote, but also under the influence of sharpening, breaking frequently the tip of the pen (and paper to write); by exercise, tactile-kinesthetic sensibility grows, providing the necessary skills for drawing and fluent writing.

Significant progress is noticed in terms of the ability to observe, meaning that students can grasp new aspects, more complex, more subtle when looking at objects or phenomena. But the basic premise remains the lead by teacher of their observation work (Cerghit, Vlăsceanu, 1988).

The visual perception is based on biological and cultural factors, such as sexual response, self-preservation, aggression, friendship and meaning of a term in a culture or another. (Cerghit, 1997).

Motricity - basic of mental development of the child

One of the basic needs that a child feels at this age is the need to move. It is envisaged not so much the movement on muscle contractions or the travel into space with mechanical and physiological load, but the

movement brought in the motor act and its subordinate to it, moving regarded as constituent element of actions with objects. On the first plan is the psychological load of the movement, reporting to objects, images, intentions prospects for it (Gavrila-Ardelean, 2009).

Schoolchild, more than preschoolers, finds a real pleasure to take all sorts of actions: he imitates what grownups do, he accompanies and emphasizes his words by mimic and pantomime, so by movements in different parts of the face or body. In some activities the movements are unpredictable, free, spontaneous their execution order having not too much importance. Other activities, however, take on a certain degree of stereotyping, automation, the order being predetermined. In this case, the movements are converted into skills. (Cristea, 2002).

The need for action by performing various movements, underlies the psychological development of the child. A child who acts with an object is more likely to develop an adequate picture about it than another who just contemplates the object. Motricity and action with the objects not only contribute to the enrichment and diversification of the child's cognitive plan, but also contribute to the completion of his personality. As the development and consolidation of different types of motor independent conduct, the child stands out more strongly about the environment, individualized himself (Kelemen, 2007).

Characteristics of psychomotricity to young schoolchildren (Arcan, Paunescu, cited by Miut, 2001):

- *postural balance*: go in a circle drawn on the floor; high jump easily;
- *visual-motor coordination*: draw a diamond by model; makes in drawing the right proportions to different objects (humans);
- *orientation in the body schema*: easily movement of orientationb in body scheme (acknowledges right, left)
- *time-space orientation*: intuits the space, distincts the time (here-there; then-now);
- *quality of the action*: has power and balance (salt 40-50 inches tall); manufactures by hand of simple objects perfecting his movements as finesse and speed in action (selects, classifies prompt different images);
- *perception*: perceives, auditory, all phonemes of mother tongue, indicating 6-7 colors or shades, has sustained attention ability of concrete object (oriented language);
- *self-awareness*: is retained, self controled, proves self-consciousness in various activities and actions (that I can do, that I do not manage)
- *consciousness of others*: communicate easily with adults, is receptive and responsive to requests, jealous in relationships with siblings, dialogues, collaborates in groups to achieve certain tasks;

- *ability to learn*: learns to write the alphabet, operate with different concepts;
- *motricity-skills*: can be guided by the language, develop their voluntary attention, improve their fine movements of the hand, removes some spatial illusions, learn to control his reactions.

This development of psychomotricity is approximate, it may vary from one individual to another, differences still occurring in the normal range. Sometimes, even after 6 years old the normal child can present coordination difficulties.

Perceptual motor and visual perceptual organizing

People fail to perceive scenes that include surfaces, parts and whole objects arranged in a coherent way in the given space. Factors that cause the perception of simple elements as organized groups are called grouping laws or principles: the principle of proximity, similarity of color and shape, good continuations, closures and joint movement (Wertheimer in 1923 cited, Miut, 2001).

It is believed that everyone has a „map" or a mental image of ambiance, namely of personal space which refers to areas where are all the personal items in an order that allows effortless use and find them fast. These dimensions are formed during elementary school. Personal space is structured around 10 years and is impregnated by the personality expansion (Munteanu, 2009).

In the training of the reading and writing, the correct functioning of the orientation activity and space structuring become sine qua non, because drawing graphic signs and follow the succession of carrying letters into words, words into sentences, the sequence of lines and keeping the spaces between them are constitute as phases of the process of lexo-graphic acquisition (Macavei, 2001).

Hypothesis

The research was conducted on the following working hypothesis:

If using specific didactic games to improve visual-motor coordination to school children, there will be some improved performance in writing acquisition.

Working from the hypothesis follows several objectives that we follow in our research: choosing a suitable sample of children - children in first grade; choice of methods by which we want to improve visual-motor coordination of children; the creation of benchmark tests to use in initial and final phase of the experiment in order to appreciate the progress made by children; use of statistical methods for processing the data that we get from the experiment.

Studied sample

We studied a sample of children in first grade. Of the 20 children in the first grade 13 were girls and 7 were boys. Since the first grade we have children of different ages between 6 and 8 years old, we considered necessary a presentation of subjects by age distribution, see Table 1 and Figure 1

Table 1

The distribution by age of the study group

Age	6 years	7 years	8 years	
Number		2	15	3

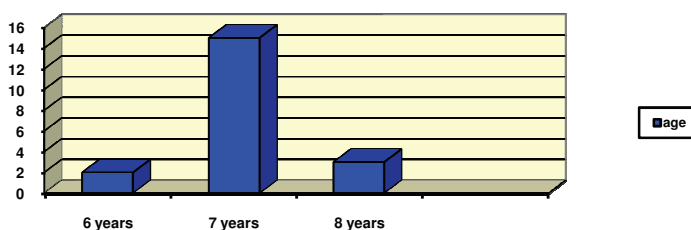


Figure 1 The distribution by age of the study group

As it is noted in the table and distribution we have 2 children of 6 years and 3 children of 8 years. Most children - 15 in number - were 7 years old.

The presence of children of 6 years can be explained from two perspectives. On the one hand the children were sufficiently well developed, both physically and mentally, from kindergarten they had been given earlier and so they followed all three groups - low, middle and high. On the other hand, the new education law, passing the preparatory class at school determined parents to give their children to school quickly to avoid complications.

The three children of 8 years old, were born in January and then the parents gave them at school, in fact, to 7 years and 8 months, considering that they prolong a little their childhood.

Methods and techniques used

Assessment Method

To appreciate visual-motor coordination of children in first grade, we considered necessary to conduct a writing sample, which was actually the first and final testing of children. The sample consisted of writing the two rows of signs on a notebook lines to first grade, signs which are commonly

used in compiling letters. Otherwise children had to write: two rows of bars, two rows of rods and two rows of oval shapes.

We took into account the mistakes made by children in the task, as follows:

- mistakes related to overcoming the horizontal lines - up or down;
- mistakes related to overcoming the vertical lines - right or left
- errors related to the actual size of the model - very small or very large figures.

For each type of mistakes made by the children was awarded one point. The share at mistakes is inversely proportional to the visual-motor coordination: the share of mistakes is higher, the visual-motor coordination is weaker and, conversely, the share of mistakes is lower, the visual-motor coordination of children is higher.

This assessment was carried out both at the beginning of the experiment - the initial evaluation and at the end of his - final assessment.

Between initial and final test was administered the experimental factor, which consisted of choosing some games to improve the visual-motor coordination of children. They will be presented in the next section.

Training methods - didactic game

By consulting the literature (Kelemen, 2007; Piaget, 2005; Jinga, Istrate, 2001) we chose the following games, we thought that have more relevance for the development of visual-motor coordination in children: *the game of introducing geometrical bodies in proper shape of a plate; beads stringing game; puzzle game; Lego.*

Results and discussions

Initial evaluation

As mentioned the assessment test of visual-motor coordination of children consisted of two rows of write indents, rods and oval shapes. The mistakes we registered were the following, see Table 2.

Table 2.

The frequency of errors in the initial assessment test

	Types of errors	number
a	overcoming the horizontal line up	75
b	overcoming the horizontal line down	63
c	overcoming the vertical line to the right	71
d	overcoming the vertical line to the left	74
e	figures too small	32
f	figures too big	41

For understanding the numbers in the table we should make an observation: there were recorded the errors of children, but a child can do

many types of errors or to repeat the same error several times, hence the larger number of errors than the number of children.

The boys recorded the highest number of errors exceeding the vertical line on the right. We appreciated this type of error as being due to the haste to finish the task outlined by the teacher. How writing is done from left to right, normally in their rush to perform the task, the boys tended to move their hand to the right for the other figure and that is why there is a greater number of this type of errors.

Next in frequency, is the exceeding of the vertical line on the left, which can have the same explanation for three children who write with their left hand, but it can be interpreted as exaggerated tendency of children to fit the space. Because at the beginning they have no assurance that the figure will go into space, they will exceed the line on the left, where starts the figure.

The lowest number of errors made by boys is figure too small. Here we met only 12 errors of this type suggesting that the boys appreciate relatively fair the amount of available space and the size of the figure they must enter in this space. Girls recorded a larger number of errors than boys, but this can be considered normal considering the fact that girls outnumber boys. Girls maximum errors are recorded at the type: overcoming the horizontal line up. But overcoming the horizontal line down registered also a high number of errors (45). This means that girls seem to have greater difficulty framing the letter between two horizontal lines compared to boys.

To see the types of errors compared to boys and girls, in the idea of establishing specific errors by gender, the results of the two sexes are shown in Table 3. and Figure 2.

Table 3. The frequency of errors compared to boys-girls at the initial assessment test

	Types of errors	boys	girls
a	overcoming the horizontal line up	20	55
b	overcoming the horizontal line down	18	45
c	overcoming the vertical line to the right	31	40
d	overcoming the vertical line to the left	28	46
e	figures too small	12	20
f	figures too big	17	24

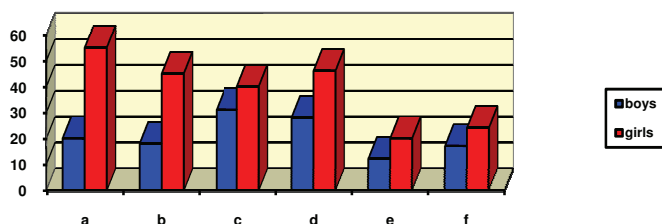


Figure 2. The frequency of errors compared to boys-girls at the initial assessment test

Boys-girls comparative analysis highlights the fact that the type of error yo which is recorded maximum number of replies is different in the two groups. For boys the maximum errors are recorded in employment between vertical lines, whether right or left (31 respectively 28 errors). For girls, the maximum errors number is recorded to overcome horizontal line up and down (55 respectively 45 errors) and to overcome the vertical line to the right. We can say that the boys fit more easily between the horizontal lines and harder between vertical ones, and the girls, conversely, fit better between the vertical lines and harder between the horizontal ones.

The lowest number of errors is recorded for both groups to figure size too small. Children of both sexes properly appreciate how small must be the figure and have less errors to realise small figures.

Figures greater than the space provided recorded also a lower number of responses compared to other types of errors. This suggests that children generally fail to appreciate pretty good the figure size which must fit to the allocated space and that mistakes appear more of a finesse coordination of motric movements and the visual, coordination which fails to fit the movement in the landmarks up, down, left and right.

The frequency of errors is presented comparatively on the three age groups (6 years, 7 years old and 8 years) - Table 4 and Figure 3

Table 4. The frequency of errors compared by age initial evaluation

	Types of errors	6 years	7 years	8 years
a	overcoming the horizontal line up	31	29	16
b	overcoming the horizontal line down	23	25	15
c	overcoming the vertical line to the right	20	35	16
d	overcoming the vertical line to the left	22	34	18
e	figures too small	13	11	8
f	figures too big	15	16	10

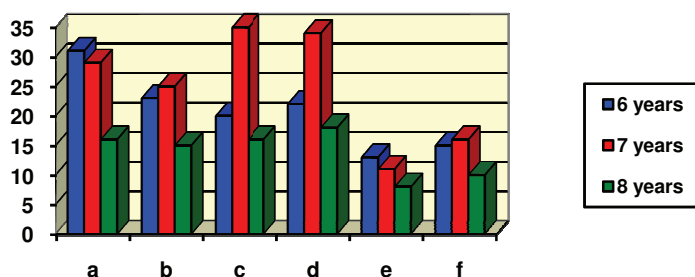


Figura 3. The frequency of errors compared by age initial evaluation

All three age groups show a relatively small number of errors in terms of figure size, whether it is reduced or enlarged. As we mentioned, we consider this as evidence that students fail to appreciate relatively fair the space allotted to the figure with its size. Regarding visual-motor coordination of great finesse, all age groups recorded a significant number of responses to overcome vertical line to the left or right, or to overcome the horizontal line up or down.

As a general finding, we should note that, overall, group age of 8 years recorded the lowest number of errors. This stuff is not surprising if we think to the stage of children development and the fact that at this age hand-eye coordination is better than at younger ages.

We must not understand erroneously that students of 7 years make the most mistakes but to think that this age group was the most comprehensive in terms of numbers. Overall the number of mistakes drops significantly with age children. As they are more aged children acquire visual-motor coordination resulting from better handling the various objects of everyday life.

The final evaluation

To complete the experiment was applied once again the writing assessment test, in the final stage. We asked the children to write the same number of rows, the same graphic signs and figures as at the initial assessment and have followed the same types of errors: overcoming the horizontal line up or down, overcome the vertical line left or right, the figures size - too small or too large.

We felt that the games we've made with the children and practiced by them for two months led to improving visual-motor coordination of children and therefore to decrease the number of errors they make to the assessment test.

The decrease in average frequency of errors is the result of children better hand-eye coordination, because the games we've used and whose effectiveness can not be denied.

For an even better view of the children progress we have made a comparative analysis between the results of the initial evaluation and final evaluation. The comparative data are found in Table 5 and Figure 4.

Table 5. The average frequency of mistakes in the initial and final evaluation

Nr. crt.	Types of errors	Initial evaluation	Final evaluation
a	overcoming the horizontal line up	75	34
b	overcoming the horizontal line down	63	22
c	overcoming the vertical line to the right	71	26
d	overcoming the vertical line to the left	74	28
e	figures too small	32	19
f	figures too big	41	17

Interesting to note is that the final evaluation increase the number of errors known as figures too small comparing with the initial evaluation where there were much errors of figures too great.

Probably from the use of games where the mistakes of forcing the parts have considerably diminished, the children found it safer to lower figures to be sure that they am not mistaken. To this is added a further precision to the winning hand-eye coordination, obtained from the use of specific games and that translates into better employment of graphic signs and figures in the adequate space.

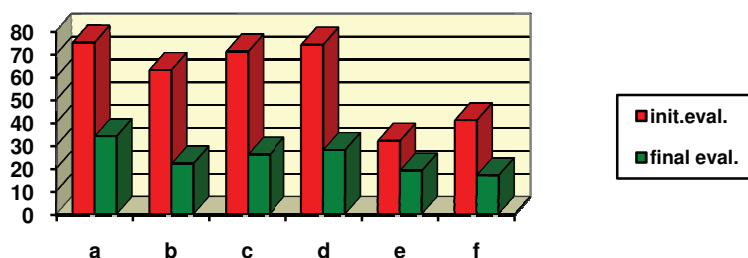


Figura 4. The average frequency of mistakes in the initial and final evaluation

The graphical representation of results is more suggestive in showing the comparative development of children within one month from the initial assessment to the final.

In Figure 4 it is more than obvious that the average frequency of errors drops to final evaluation by more than half of the average frequency of errors in the initial evaluation. This phenomenon is true for all six types of errors that we considered in the assessment test for visual-motor coordination (exceeding the horizontal line up or down overruns vertical lines right or left, figure size - too big or too small).

Our results, allow us to say that the working hypothesis proposed earlier in this experiment has been confirmed by the results.

Visual-motor coordination of children can be improved through the consistent use of specific games that bring growth and improvement of it. Of course there are other games which can be used for this purpose. We do not claim to say that only the games we use can improve hand-eye coordination. The game "Learning to sew" (where you put the needle and thread to be executed certain types of stitches that are within certain limits) can be also successfully used for the same purpose. Maze games - where a ball should be taken to the center of the maze by tilting it to one side or another - can also achieve the same role. Choosing the appropriate game for visual-motor coordination improvement depends on the imagination and teacher resources.

It is very important that teachers be constantly preoccupied to improve skills of children, obtaining higher performance, to facilitate their assimilation into the school faster school skills, reading and writing.

How, at this age, the game is still one of the main activities of the individual in its development, it is clear that only by game can be obtained the results you want and that will contribute to the harmonious development of children.

Conclusions

During the interval of eight weeks, while we used those games, we found a gradual decrease in the average number of mistakes. Thus, if the initial to the first use of games overall average error was 78.32, last used games before the final evaluation of visual-motor coordination of children overall average error was 21.07.

As regards the comparison between the initial and final results these were:

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up or down, overruns the vertical lines right or left, figure size - too big or too small).

The decrease in average frequency of errors is the result of a better hand-eye coordination of children, because the games we've used and whose effectiveness can not be denied.

Our results, allow us to say that the working hypothesis proposed earlier in this experiment has been confirmed by the results.

Choosing the appropriate game for visual-motor coordination improvement depends on the imagination and teacher resources.

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