THE RELATIONSHIP BETWEEN VISUAL PERCEPTION AND MOTOR DEVELOPMENT IN SCHOOLCHILDREN WITH INTELLECTUAL DISABILITIES

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Abstract: The author makes a review of the psychological and cognitive development of the young schoolchildren, referring to the literature. There are mentioned the terms in the literature intended to denote intellectual disabilities and their meanings. Research has started from the premise that there is a relationship between motor development and visual perception in children with intellectual disabilities who are integrated into mass school. A sample of 43 children with mild and moderate intellectual disabilities (Raven Color test) were studied for the perceptual level (the Bender-Santucci test) and the level of motor development (Ozeretzki scale). The processing of the obtained results reveals that: there are significant differences between schoolchildren from the point of view of the visual-spatial perception; there were significant differences in motor development among schoolchildren; there is a positive correlation of intelligence with visual-space perception, so that a high level of intelligence is associated with a high level of visual-spatial perception.

Key words: visual perception, motor development, intelligence, children with intellectual disabilities

Thoretical frame
The whole psychic development concerns the issue of adaptation that is achieved by adopting new forms of balance. When the teacher insists exaggeratedly on discipline, the child presents a difficult adaptation that is manifested by increased nervousness and fatigue. At age 7, there has already been a relative psychological detachment, an increase in expansion, greater
extraversion and euphoric experiences, which means that school adaptation has exceeded the first tense phase. This is also evident in the child's speech, by the frequent use of the superlative in the description of situations and events, as well as by the manifestation of the curiosity towards the extracurricular and street environment (Tinica, 2004).

After eight years, the child is more sensitive to social education, which means that the adaptation has gone beyond another tense stage, reaching a phase in which balance and a more prominent self-control dominate. He becomes more reflective and concerned about issues such as the children's origin, social affiliation, self-identity. And belonging to class and school is a pride (Picker, Walsh, 2013).

Towards the end of the early school year, intellectual development is evident and the self-evaluation of its capacities is more realistic, as the critical spirit is making continuous progress. Under the influence of the school, perceptive sensory capacities are trained and exercised as tools of cognition. The visual and auditory acuity reaches 9-10 years. All forms of learning contribute to their development, especially those related to writing, drawing, composing that require fine perception and rapid interpretation. Perceptual discriminative sensitivity is also stimulated by identifying the phonemes that make up the words and converting them into graphs (Atkinson, 2002).

Compared to other periods, in small school, mental transformations are slow and non-spectacular, but they are still fundamental to the child's further development. Interesting is the side of the general orientation materialized by the abandonment of some prominent pre-school interests such as drawing and modeling. The little school gives the impression that it is less spontaneous in making its products. Appear preferences for biographies, legends, as well as for arithmetic and reading lessons, film, television. They are, for the beginning, collected from everything: from pictures, stamps, nails, buttons, to rabbits, insects (Vernon, 2006).

Children go through a phase of excessive sensitivity to new rules. Many times, they do not tolerate breaking rules and adopt attitudes towards colleagues who "forget their notebook at home," or those who "do not sit behind their backs" (Bonchis, 2002).

The discriminative aspects that develop in children on the perception of small space are also important. The spatial orientation on the paper, the decoding by differentiation of the graphs, the writing, support a complex intellectual activity. In the same context, memory, intelligence, attention, representation (Landsberg, 2005) takes place.

In the process of learning, the child frequently operates with schemes and images that facilitate the manipulation of information, and in which an important role is played by the representations. Based on these, symbols and
concepts develop. The child assimilates a series of symbols in the game, then realizes that letters, words, numbers, and different signs conserve significant amounts and relationships. The discovery of causality and defining attributes enriches the knowledge of the child, which enables it to carry out grouping operations using the concepts from which the correlation between the real, possible and impossible, transpires. This is achieved by both direct, conscious knowledge and indirect learning, deduced. As a result of this correlation, the child acquires the ability to distinguish between the fictional and the real world, determining degrees of acceptance of the phenomena he comes into contact with. Under these circumstances, the formation of the realistic-naturalistic concept becomes more and more evident.

In thinking, the logical critical spirit and the operation of sets of rules as assertions about concepts intervene more and more. Positive thinking creates positive feelings and leads to an active and comfortable adaptation to reality (Roman, 2018). The basics of the rules are operations, and they relate to thinking and intelligence relationships using concepts or information. The progress made in using the rules correlates with the development of general intelligence. Piaget (2005) considered that the whole mental development tends to formal logical thinking.

Language is one of the most significant phenomena that differentiates children from entering school. In writing, there are omissions of graphs, replacements, grammatical disagreements, punctuation, incomplete expressions. Generally, linguistic competence is more developed than performance. Developing language skills is achieved by expanding knowledge about the roots of words, prefixes, suffixes and the application of grammatical rules and the use of abstract language, independent of context. Words and grammars become a communication tool that facilitates the child's adaptation to various situations (Dughi, Ropota, 2018).

There are three stages in the writing-reading evolution. A first step is to identify the sounds (letters) as elements of the words. This process is accomplished by the action of separating words in syllables. Silab's are units of pronunciation extracted from the flow of speech and words, resemble - more or less among themselves, allowing the auditory field of their analysis to be better distinguished by their sound components. This phase, called pre-sessions, creates a new optic to the spoken language and a new possibility of approaching it. Syllabus separation is exerted until it becomes a current, intensely proven capacity. At the same time, writing skills are prepared. The activities for this purpose create a great flexibility and precision of the pen movements on the spaces bounded by the helpline of the notebooks. It is believed that perceptual learning mechanisms are achieved by looking for clues that are retained, not
because of trial and error, or due to reward and punishment, but to the complex adaptive requirement to reduce uncertainty (Bertelli et al., 2016).

The second stage begins to differentiate the sounds and their graphic correspondences and to be mentally associated. This is where active literacy begins. The graphical identification of sounds and their writing creates a condition for the child to distinguish large print and hand from small ones, a relatively difficult process in which reading his own writings is more slowly perfectionable than that of printed texts. Children, however, go through the first part of the alphabet in a few months, with the gradual learning of letters to the proper sounds and their writing. During this period, the auditory expectation is a critical one, a phenomenon that can be noticed by completing, replacing, reading mistakes, by supporting the context of these phenomena (Cederborg, La Rooy Lamb, 2008).

In the second part of the first school year, the child reinforces the abilities to assimilate the symbolism involved in the alphabet and to write and read the figures. With this, in fact, the third stage of literacy begins, in fact the longest. It is the stage in which writing-reading consolidation takes place. This stage is extended in the second and third year of the school. Characteristic is the increase in the expectation of reading, which gradually becomes fluent and expressive (Handley, Southwell, Steel, 2012).

Intellectual disability, one of the major psychiatric dysfunctions, is a concept that is still undefined with precision, involving many aspects of a medical, psychological, pedagogical, sociological and even legal nature. In general, intellectual disability (synonymous with mental deficiency) means a significant reduction in mental capacities that causes a series of disorders of the individual's responses and mechanisms of adaptation to the changing circumstances of the environment and the standards of social cohabitation in a which places the individual in a state of incapacity and inferiority, expressed through a state of disability in relation to the other members of the community to which he belongs (Horner et al, 2005).

Intellectual disability is understood as a global deficiency that significantly influences socio-professional adaptation, personal and social competence and autonomy, affecting the whole personality: structure, organization, intellectual development, affective, psychomotor, adaptive-behavioral.

In the United States, the American Association for Intellectual Disability considers that this deficiency exists whenever there is a significantly lower than average intellectual activity associated with adaptive limitations in two or more areas: communication, self-care, social networking, community services, situational orientation, health and personal security, knowledge applicable in everyday life (Osiceanu, Zaharescu, 2017).
In our country, the first rigorous definition of mental deficiency belongs to Alexandru Roşca (apud Buică, 2004), for whom this abnormality represents a state of restricted potency or a stop in the cerebral development, as a result of which the person reached is unable to mature adapt to its environment, to the requirements of the community, so that it can maintain its existence, without oversight and external support.

Ionescu and Radu (apud Bonchiş, 2000) understand by mental deficiency the type of deficiency determined by a complex of etiological factors with unfavorable action on the brain during its maturation, having two main consequences: to stop or slow the pace of evolution, especially of the functions cognitive and diminishing social competence.

Gavrila-Ardelean M. and Gavrila-Ardelean L. (2010) state that mental deficiency refers to the phenomenon of organic damage and/or functional impairment of the central nervous system, with negative consequences on the process of mental maturation, development in different aspects to the individual concerned. Mental Disability is the disadvantage that mental deficiency creates in the context of the individual's adaptation and integration relationships in the social environment to which he or she belongs.

In some specialty circles, a distinction is made between the mental deficiency, which indicates an abnormal level of organization and mental functioning, with direct implications on the organization and structuring of the individual and the deficiency of intellect, a term that denotes the inability of the individual to deal with tasks included in the act of learning, as a consequence of the inadequacy of these tasks, often overworked in school, to the specific and actual potential of the child. In other words, mental deficiency - which is an impairment of evolution and development due to the pathology of organizing and functioning of psychic structures, differs from the deficiency in the intellect where, even under the conditions of a normal mental organization, the individual can not exceed certain limits adaptation and learning (Bonchiş, 2004).

Specialist literature uses a number of synonymous terms to designate mental deficiency, the most common of which are: mental retardation, mental retardation, oligofrequency, mental retardation, mental impairment, mental retardation, mental retardation, mental disability, mental debility, behavioral alteration adaptive, altered skills / maturity of learning and socializing, etc. (Cantone et al, 2018). Due to the fact that these terms, with the exception of the last two, have a blatantly pejorative nature, the specialists have decided in recent years to use the term intellectual disability.

Most of these terms are mainly used in the psychiatric field. In recent years, medical terms specific to psychiatric, classical and modern nosology have been used less in the field of special psychopedagogy, with strong
recommendations from practitioners in this field to abandon medical terminology because of the effects induced by the nosological label on the psychological plane and negative public perceptions / representations about this category of people (Ghergut, 2005).

This attitude is of great importance, especially from the point of view of the socio-professional integration of individuals and the removal of the mentalities and prejudices that constitute real barriers to the understanding, acceptance and valorisation of those persons.

**Objectives and Hypothesis**

The research started from the following assumptions:

- **H1** - there are significant differences in school children in terms of visual-spatial perception based on the level of intelligence
- **H2** - there are significant differences in terms of motor development in school children based on the level of intelligence
- **H3** - there is an association between the level of intelligence, the visual-space perception and the motor development

From the aforementioned assumptions, the following objectives are achieved:
- identifying the level of visual and spatial perception in children with intellectual disabilities;
- identifying the level of motor development of children;
- identifying an association between the level of intelligence, the visual-space perception and the motor development;

**Methodology**

*Sample taken into study*

The sample taken into study was made up of two groups of children with intellectual disabilities:
- group 1 - 22 scholars with mild intellectual disabilities (QI ranging from 60 to 69)
- group 2 - 21 scholars with moderate intellectual disabilities (QI ranging from 50 to 59).

The level of disability was appreciated by the psychological test of nonverbal, global intelligence testing: Raven color.

The samples were made up of children with intellectual disabilities from different schools in Arad, which were included in mass education. Table 1 shows the mean age values for both samples.
Table 1

Values of central trend indicators for the studied group

<table>
<thead>
<tr>
<th>Group</th>
<th>Characteristics</th>
<th>Age average</th>
<th>Std. Dev.</th>
<th>Total subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>schoolchildren with mild intellectual disability</td>
<td>7.22</td>
<td>0.42</td>
<td>22</td>
</tr>
<tr>
<td>2</td>
<td>Schoolchildren with moderate intellectual disabilities</td>
<td>7.23</td>
<td>0.43</td>
<td>21</td>
</tr>
</tbody>
</table>

Methods

The Raven colour test

It is a test destined to show the global nonverbal intelligence coefficient.

The Bender-SantucciTest

One of the factors influencing the child's school performance is the perceptual-motor function, ie the student's ability to accurately perceive spatial configurations, compare them to each other, so to see space and form, to remind the form that can serve as the content of various mental operations. One of the tests by which we can diagnose this function is the one known as the Bender-Santucci sample, a proof sample of geometric figures. The Bender-Santucci sample consists of 5 patterns made on a 10/15 cm cardboard.

The Bender-Santucci test, being a genetic test, highlights the evolution of the reproduction of fundamental geometric figures from one age to the next. In normal children due to harmonious and logical development, it is easier to establish rules characteristic of a chronological age than to children with intellectual disabilities. Heterocronia, which is specific to mental insufficiency, makes it impossible to identify mental deficiency in terms of mental development and com- pliance with the norm of the same chronological age or even the same mental state.

An indication of the heterocrony of mental deficiencies is the high frequency of "unclassified" responses that occurred in different samples. Santucci's rating system designed to evaluate reproductions of subjects with normal intellect, does not allow penalizing those performances of mental debilitations that are far inferior to normal. To highlight quotas of "unmerited", in addition to the original rating system, some penalties were imposed. Thus,
the following issues will be given the minimum rate (zero): scratch that does not allow identification or evaluation of the component elements of the model; rotating drawings close to or over 180 degrees; replacing a pattern during reproduction with another previously perceived pattern; the gross non-observance of the number of elements of the different models; the impossibility of reproduction of simple geometric figures, normally dominated by small ages (circle, square).

The prognostic value of the test is evidenced by its strong correlations at the $p = .01$ threshold with the copy sample ($r = .76$), the dictation ($r = .67$) and the reading ($r = .84$).

Ozeretki Scale for motor development evaluation

The Ozeretki scale (for the 4 to 13-14 year age) determines the degree of normal development of motor movements. It operates with the concept of motor age or age of motricity and carries out a gradual assessment of normality of motor development from 4 to 14 years. It includes six samples each year, differentiated for boys and girls. The movements are performed at the verbal command of the evaluator, and the evaluation is done in the classical Binet-Simon tests, that is, calculating the delay or the advance of the driving age related to the chronological age. In some situations, the scale can highlight motor skills specific to sporting activities.

The significance of the results is as follows:
- slight motor delays: when we have a delay of 1-1.5 years;
- motor deficiency: 1.5 to 3 years delay;
- severe motor deficiency: 3 to 5 years delay;
- deep motor deficiency: delay of over 5 years.

Procedure

The research took place in mass schools, where children with intellectual disabilities were included in the integration program were in the first class. The tests were applied for a period of two months; the parents were informed in advance and gave their written consent for testing.

The sample surveyed comprised 43 children with intellectual disabilities divided into two groups according to the severity of the disability. The tests were applied both individually and collectively.

Results and discussions

Following descriptive processing, histograms show a symmetric distribution of data, which allows us to use parametric statistical methods. We used the t-test for independent samples to identify the differences between the groups studied and the statistical significance of these differences.
**H1:** - there are significant differences in school children in terms of visual-spatial perception based on the level of intelligence

<table>
<thead>
<tr>
<th>Visual-spatial perception</th>
<th>Average</th>
<th>Std. Dev.</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>52.27</td>
<td>2.14</td>
<td>22</td>
</tr>
<tr>
<td>Group 2</td>
<td>28.80</td>
<td>2.18</td>
<td>21</td>
</tr>
</tbody>
</table>

where: group 1 = children with mild intellectual disability  
group 2 = children with moderate disabilities

As can be seen from Table 2 there are significant differences between pupils from the point of view of the spatio-spatial perception, since the value of the test \( t = 35.57 \) is statistically significant for a significance threshold \( p = 0.974 \).

Table 3 shows the significance of differences in visually-spatial perceptions in small schools.

<table>
<thead>
<tr>
<th>Visual-spatial perception</th>
<th>df</th>
<th>( t )</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intergroup</td>
<td>1</td>
<td>2.14</td>
<td>0.974</td>
</tr>
<tr>
<td>Intragroup</td>
<td>41</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Visual-spatial perception is much better for children with intellectual disabilities compared to those with moderate intellectual disabilities. This confers the hypothesis we initially formulated that the visual-space perception is influenced by the intelligence coefficient. The H1 hypothesis was confirmed by our results.

**H2:** there are significant differences in terms of motor development in school children based on the level of intelligence
Table 4 shows the values of central trend indicators at the level of motivation in school children.

**Table 4**

Values of central trend indicators at level motricity in school children

<table>
<thead>
<tr>
<th>Errors</th>
<th>Average</th>
<th>Std.dev</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>8.34</td>
<td>0.29</td>
<td>22</td>
</tr>
<tr>
<td>Group 2</td>
<td>5.23</td>
<td>1.82</td>
<td>21</td>
</tr>
</tbody>
</table>

where: group 1 = children with mild intellectual disability  
group 2 = children with moderate disabilities

Table 5 refers to the statistical significance of motor-grade differences in school children.

**Table 5**

Meaning of differences in level motricity in small schools

<table>
<thead>
<tr>
<th>Motricity</th>
<th>df</th>
<th>t</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intergroup</td>
<td>1</td>
<td>17.215</td>
<td>0.00</td>
</tr>
<tr>
<td>Intragroup</td>
<td>41</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The hypothesis H2 was confirmed by our results.

**H3** - there is an association between the level of intelligence, the visual-space perception and the motor development

As can be seen from Table 6, there is a positive association of intelligence with visual-space perception, a high level of intelligence is associated with a high level of visual-spatial perception, at a correlation coefficient $r = 0.961$, significant for a significance threshold $p = 0.01$.

**Table 6**

Relationship of intelligence with visual-space perception

<table>
<thead>
<tr>
<th></th>
<th>Intelligence</th>
<th>Visual-spatial perception</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intelligence</td>
<td>1</td>
<td>0.961 **</td>
</tr>
<tr>
<td>Visual-spatial</td>
<td>0.961 **</td>
<td>1</td>
</tr>
</tbody>
</table>

The correlation is significant at a significance threshold of $p = 0.01$. The hypothesis H3 was confirmed by our results.
Conclusions

The research was conducted in normal schools where children with intellectual disabilities were included in the first grade within the integrated education program. Samples were applied for a period of two months, parents being informed in advance when they were asked for written consent to the test.

The sample surveyed consisted of 43 children with intellectual disabilities divided into two groups: children with mild intellectual disabilities (QI between 60 and 69) and children with moderate mental disabilities (QI between 50 and 59). Samples were applied both individually and collectively.

After the statistical processing of the obtained data, the following aspects were highlighted:

There are significant differences between pupils from the point of view of the visual-spatial perception, results obtained by processing the data with the t test for independent samples, which is significant, so hypothesis no. 1 confirmed.

Hypothesis no. 2 was also confirmed by the results obtained by processing them with the significance test t for independent samples, showing significant differences in the motor development in school children.

Verification of hypothesis no. 3 shows the existence of a positive correlation of intelligence with visual-space perception, so that a high level of intelligence is associated with a high level of visual-space perception.

We consider it necessary to implement programs of intervention that improve the motor development of children with intellectual disabilities and, of course, spatial perception.

Acknowledgement: We hereby state that the subjects involved in our research were informed about the voluntary character of participation in this research, about the understanding of information and of that fact that withdrawal from research is possible at any time without negative consequences upon the participant. The research complied with all ethical research standards, the research participants/participants’ guardians giving their consent to participate in the research.

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