Original review

Didactic materials for cognitive stimulation of schoolchildren with mild intellectual disabilities

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ABSTRACT

Intellectual disability is a reality present in the Cuban educational context, presenting limitations in cognitive abilities and skills, as well as affective, behavioral and psychosocial problems. As a referent in special education, psychoeducational action has a considerable impact on the stimulation of the cognitive functions of each individual. Therefore, it is proposed as an objective: To elaborate didactic materials as a psychotherapeutic strategy of cognitive stimulation to enhance learning in children with Mild Intellectual Disability. From the implementation of the designed resources it was possible to improve the functional and adaptive state of the cognitive processes in the educational population.

Keywords: Neuropsychological Rehabilitation; Cognitive Stimulation; Mild Intellectual Disability; Developmental Learning**.**

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Introduction

Education, in general; and learning, in particular, is much more than collecting knowledge or building it, it should be advocated to propose realistic answers to the problems and needs faced by education and learners in the new social conditions, so it is required to mobilize all the accumulated experience, the knowledge of the different domains of knowledge and the capacities for action, interaction and inclusion to generate an intervention model that unifies knowledge, social integration actions and self-knowledge, from a dynamic, holistic and transdisciplinary perspective.

Therefore, Cuban education today requires the gradual transformation of teaching methods and means that allow the facilitation and direction of content towards self-management of knowledge and learning, combining the pursuit of excellence and quality of the educational teaching process with the principle of equity and equal opportunities. In order to respond to these needs in the educational context, it is necessary that teaching and learning achieve a developmental and cooperative significance, both for the learner and for the one who teaches, becoming the pedagogical paradigm that is sought to be established in the education of today's Cuban society.

The presence of schoolchildren with Mild Intellectual Disability is a reality in the country's classrooms, erroneously presented as a pathology or mental disorder; although it is a form of intellectual functioning characterized by difficulties in learning and cognitive processing is not considered as such by the World Health Organization, but one of the main causes of low performance and failure in the early stages of school life due to the unstable or fluctuating value they present in IQ and the way they are able to respond to internal and external stimuli that impact them (Iglesias, 2017, 2018).

Cognitive stimulation, as an educational reference, is conceived as a kind of mental gymnastics that improves the adaptive functioning, the quality of the processes and higher psychic functions of the subject through exercises that promote the psychic activity of higher cognitive processes such as thinking, language, memory, attention, perception and higher cognitive skills such as visuoconstruction, gnosias and praxias; allowing them to eradicate or reduce the deficiencies they present at the cognitive-instrumental level, as well as in affective, behavioral and psychosocial problems; therefore, psychoeducational action with this approach has a considerable impact on the cognitive development of this population (Medeiros, 2016).

In order for the intervention of the psychopedagogist in the stimulation of cognitive processes and functions with a neuropsychological approach in this population to be

effective, it is necessary to unify the criteria of specialists in psychology, neuropsychology and education in order to support practices with greater impact and scientific rigor from the field of neurosciences of education. Therefore, in the educational area, specialized intervention from this approach is a premise, since the essential components of low school performance of schoolchildren with these characteristics can be treated through this type of specialized strategies, individualizing them to the needs of the population and each subject, significantly improving their health status and quality of life with the relevant development of guidance or treatment strategies (Molinero, 2010; MINED, 2017).

Based on the above, the need arises to find variants to stimulate cognitive processes in terms of learning of schoolchildren with mild intellectual disabilities. Taking into consideration the elements required to respond to the social demands of the country within the framework of the current Improvement of the Educational System, the proposal arises to elaborate didactic materials as a psychotherapeutic strategy for the cognitive stimulation of schoolchildren with mild intellectual disabilities.

Development

Taking as a reference the analysis of the definitions provided by specialists in the field of study, new contributions are offered to enrich the state of the art with emphasis on the appropriate use of technological resources in the population with intellectual disabilities, in order to enhance the effective development of this population in their daily development and as a contribution to the use of new strategies to strengthen the relational links between theory and practice, adopting new ways of satisfying the specific needs of the subject from the diagnosis, design, execution, evaluation and control of the strategies assumed by the specialists in charge in order to maintain solid the bases that sustain a heterogeneous and diverse society.

Currently there is scientific evidence that clearly establishes the potentialities and benefits of cognitive stimulation, as there are remarkable qualitative and quantitative changes that infer the results obtained in multiple subjects through the use of this type of treatment (Medeiros, 2016). In recent years, neurosciences and cognitive psychology have been revolutionizing their theories and field perspectives in line with the historical-

concrete moment, facilitating the creation of more advanced treatments and methods to reach diagnoses and treatments in a timely and accurate manner, making it possible to establish different strategies that allow the individual to raise the level of functionality in other areas such as emotional, interpersonal, behavioral and practical; making it possible to perform effectively in their daily lives and significantly improve their quality of life.

According to Mateer (2006), cognitive stimulation could be defined as all those activities aimed at improving general cognitive performance or any of its processes and/or components in subjects with some type of injury or damage to the nervous system. Therefore, this type of intervention would consist of combining all the methods, techniques and instruments necessary to reduce the underlying limitation, allowing individuals to reach an optimal level of social integration (Tirapu, García, Luna, Roig & Pelegrín, 2008).

In order to achieve the effectiveness of the intervention, it is valid to establish the level and character of the emerging difficulties in these processes in order to understand how the cognitive functions are affected in each of the developmental spheres that make up the psychic life of the child. From these data, we proceed to determine how and why the difficulties arise and what is their effect to a greater or lesser extent or their systemic character. The challenge is to identify clearly and with appropriate evaluation methods which are the deficient cognitive factors responsible for a deficient integration and automation of a given functional system, as well as its systemic effect on school activity (Rojas, García, Solovieva & Quintanar, 2014).

From the historical-cultural approach, school activity requires the participation of different cognitive factors, which refer to highly specialized brain sectors. Each of them makes its contribution according to the required actions, among which are: kinesthetic analysis and synthesis, sequential organization of movements and actions, phonemic analysis and synthesis, regulation and control of activity, audio-verbal retention, visual retention and spatial integration, among others (Vygotsky, 1989; Medeiros, 2016; Roque, Jústiz and Martínez, 2019a, 2019b).

In special education it is a considerable challenge to carry out this type of interventions, due to the scientific-technical development of society, the qualitative, quantitative and socio-cultural changes that have transcended the educational experience itself, and that increasingly increase the challenges posed from the attention to diversity and equity of opportunities, with the hope of giving solution to these specific educational needs from

the general and particular curriculum of such education; demanding to update and renew the methods and means of teaching of each special education teacher (Agenda 2030, 2015).

In the context of special education, it is common to encounter the term intellectual disability, terminology frequently used to refer to a certain sector of the educational population that presents some deficit or limitation in cognitive abilities or skills. According to the American Psychiatric Association, intellectual disability is a disorder that begins during the developmental period. Such a disorder includes limitations of intellectual functioning as well as adaptive behavior in the conceptual, social, and practical domains (Iglesias, 2017, 2018).

Currently, the conceptualization has been readapted and focused on cognitive functioning capacity, emphasizing the limitation of adaptive capacity in at least two of the following areas: communication, self-care, daily life, personal/social/interpersonal skills, use of community resources, self-control, academic skills, leisure, health and safety (Molinero, 2010). Therefore, the lines of action and impact on these subjects should be diverse and multidisciplinary, but should always start from their capabilities, potential and skills and not from their weaknesses or difficulties as is often the case in educational practice (Roque, Jústiz and Martínez, 2019a, 2019b).

In these cases, the objectives of this type of intervention are to develop mental capacities, improve and optimize their functioning. In each case, the aim is to activate, train and exercise certain cognitive capacities and the components that integrate it, in an adequate and systematic way, to transform them into ability, a habit and/or a skill through the following strategies (Molinero, 2010; Medeiros, 2016; Roque, Jústiz and Martínez, 2019a):

Restoration-Restoration: In this process, cognitive functions are stimulated and improved through direct and centralized action on these functions. It allows reorganization and/or reconstruction by training. This is the so-called "deficiency model", it focuses on the premise that repetition and/or practice to improve performance tasks.

Compensation: It is assumed that the altered function cannot be restored and, therefore, attempts are made to enhance the use of different alternative mechanisms or preserved skills.

Substitution: It is based on teaching the subject different proprioception strategies that help to minimize the difficulties resulting from cognitive dysfunctions. It also proposes

that, for the partial or total loss of central function, a substitute must be found to reduce the impairment in daily functioning. This model is referred to as the "absence model", where external or internal support strategies are established.

Activation-Stimulation: It is used to release blocked areas that have decreased or suppressed their activation. It manifests itself in a slowing down of the speed of information processing, fatigue or lack of motivation.

Integration: It is used when there is a deficient interaction between functional modules or when there is interference in their temporal interaction. It is also called "interference model", it is about improving mental activity in a global way, working with an ecological model.

The importance of designing this type of intervention strategies is revealed in the requirements and demands required by the Improvement of the Educational System in Cuba and based on the objectives 3 and 4 of the 2030 Agenda for Sustainable Development (Agenda 2030, 2015; Ministry of Education, 2017) in favor of the teaching-learning process at this educational level, contextualizing cognitive stimulation from neurosciences towards special education and in dialectical relationship between individualized and collective, equitable and diversified attention and as a way for the neurocognitive development of schoolchildren.

As a reference, the proposal takes the following elements as active indicators of cognitive stimulation (Rojas, García, Solovieva and Quintanar, 2014):

Errorless learning: taking into account that the subject may not be able to remember the feedback of the trials in which he/she has made a mistake and, therefore, is more prone to make the same mistakes again by implicit memory mechanisms.

Visualization: based on the idea that visual associations improve the encoding, storage and subsequent recall of verbal information since memory systems benefit from double processing.

Semantic strategies: have in common that they aim to stimulate encoding by means of semantic cues, making it more elaborate and distinctive, with the intention that the information is memorized at deep processing levels and these cues can be used during recall (visual or auditory).

Spaced retrieval: aims to facilitate the recall of information by progressively increasing the time intervals between the presentation of a material and the subsequent response it is intended to evoke.

Fading of cues: aims, firstly, to facilitate the recall of information by providing cues for recall - similar to the facilitation sought by errorless learning - and, secondly, to progressively decrease the need for such cues until the subject spontaneously provides a correct response.

Proposal of didactic materials to stimulate cognitive processes in schoolchildren with Mild Intellectual Disability:

Material 1. ABC: Cognitive stimulation booklet for special education.

Category: Mild Intellectual Disability.

Number of activities: 28.

Total number of exercises: 307.

General objective: To stimulate cognitive processes in schoolchildren with Mild Intellectual Disability, enhancing developmental learning.

Method: Global cognitive stimulation.

Evaluation method: Individual evaluation sheet.

Functional level scale: (C) Function preserved; (AL) Mild impairment; (AM) Moderate impairment; (AS) Severe impairment and (P) Function lost).

Table 1. Functional level scale

Evaluación	C	AL	AM	AS	P
Nivel 1	sin error	1 error	2-3 errores	4 errores	+ de 4 errores
Nivel 2	sin error	1-2 errores	3-4 errores	5 errores	+ de 5 errores
Nivel 3	Hasta 1 error	2-3 errores	4-5 errores	6 errores	+ de 6 errores
Nivel 4 y 5	Hasta 1 error	2-4 errores	5-6 errores	7 errores	+ de 7 errores

Source: Infuceba

Workbook exercise system:

- Global exercises: Mandalas.

Objective: To exercise the subjects' praxical functions through psychomotor activity.

- Exercises 1-5: Reading and Writing.

Objective: To improve motor control of writing at the graphic and motor level by performing visuoconstruction exercises.

- Exercises 6-7: Letters in space.

Objective: To optimize attention and perception processes through the identification of objects in the environment.

- Exercises 8-10: Coloring figures.

Objective: To enhance executive functions through logical reasoning and decision making.

- Exercise 1-3: Letters in space.

Objective: To optimize attention and perception processes through the identification of objects in the environment.

- Exercise 4-6: Language.

Objective: To facilitate the appropriation of language through the identification of figures of speech.

- Exercise 7-10: The World of Letters

Objective: To improve motor control of writing by performing exercises at the graphic and motor level.

Complementary materials:

1. Cognitive stimulation booklet for special education: Specifications for the teacher.

Objective: To guide teachers in the stimulation of cognitive processes in students with DIL through the cognitive stimulation notebook.

2. Cognitive stimulation booklet for special education: Specifications for the family.

Objective: To guide the family in the stimulation of cognitive processes in schoolchildren with DIL through the cognitive stimulation notebook.

Material 2. La Granja: Multimedia of cognitive stimulation for special education. ABC Series.

Theme: Farm animals.

Audiovisual components: horse, pig, goat, goat, hen, rooster, cat, sheep, duck, dog, chick, frog and cow.

Number of activities: 48 (12X4).

Total number of exercises: 240.

General objective: To stimulate cognitive processes in schoolchildren with DIL enhancing developmental learning.

Method: Globalized cognitive stimulation.

Form of evaluation: Individual evaluation sheet (Functional level scale).

Complementary materials:

1. La Granja: Multimedia of cognitive stimulation for special education. ABC series. Specifications for the teacher.

Objective: To guide teachers in the stimulation of cognitive processes in schoolchildren with DIL through educational multimedia.

2. La Granja: Multimedia of cognitive stimulation for special education. ABC series. Specifications for the family.

Objective: To guide the family in the stimulation of cognitive processes in schoolchildren with DIL through educational multimedia.

Methodology

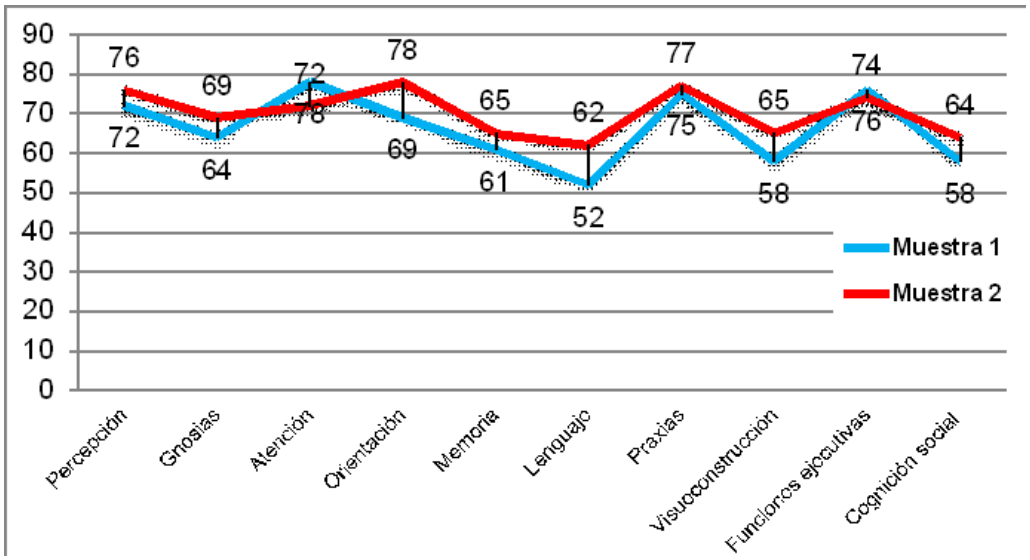
This research was carried out at the Ignacio Agramonte Loynaz Special School in the municipality of Camagüey using a quasi-experimental design. An exploratory study was used, of a population of 60 first cycle students and a sample of 10 students was selected (intentionally) who meet the diagnostic requirements for mild intellectual disability. The study presented here is framed in the experimental-causal work methodology, from primary sources, based on a stratified sample of subjects in two periods of neurocognitive development: pre-operational period - from 5 to 6 years old - (5 schoolchildren) and period of logical-concrete operations - from 7 to 8 years old - (5 schoolchildren) with the purpose of inferring the effectiveness of the proposal according to the developmental stages. The techniques used were observation by means of a survey and a rating scale with the purpose of specifying the degree to which the deviation of the development under investigation is manifested in the sample. Psychometric techniques such as the Brain Function Dominance Test (TDFC) and the Basic Functional Integration Test Battery (INFUCEBA) were used to diagnose the sample, analyze the current state of the population to be worked on and its possible treatment and follow-up. The descriptive psycho-pedagogical tests (ABC Test) to check the individual state of the schoolchildren for each function and cognitive process and the criteria of specialists in order to assess the relevance, feasibility and validity of the proposal of didactic materials for cognitive stimulation as a contribution to the educational praxis.

Analysis and discussion of results

During the study it was possible to corroborate that the sampled schoolchildren coincided with the diagnostic characteristics of mild intellectual disability for most of

the cognitive stages and through the implementation of the Descriptive Psychopedagogical Test (ABC Test), TDFC and INFUCEBA it was possible to determine which functions or processes should be exercised through cognitive stimulation strategies.

Source: Descriptive Psychopedagogical Test



Graphic1: Results obtained by sample during initial diagnosis

To determine possible variations by developmental stage, the sample was stratified in order to assess the relevance of the exercises designed by period or time of development and the maturation of cognitive processes during the intervention process.

In Sample 1 (5-6 years old) the following variations were obtained:

100% of the sample agrees with the diagnosis of mild intellectual disability.

100% of the sample presents difficulties in processing information.

60% (3) show interest in carrying out the activity.

80% (4) of the sample manifests frustration in the execution of the activities.

20% (1) show an adequate development of social skills.

60% show hyperactivity and scattered attention during the activity.

Only 20% (1) managed to execute the task correctly in the expected time.

40% (2) use the resources provided correctly.

In Sample 1 (7-8 years old) the following variations were obtained:

100% of the sample agrees with the diagnosis of mild intellectual disability.

60% (3) of the sample presents difficulties in processing information.

80% (4) show interest in the realization of the activity.

40% (2) of the sample manifests frustration in the execution of activities.

60% (3) show an adequate rhythm and dynamics in the activity.

80% (4) show scattered attention during the performance of the activity.

Only 40% (2) managed to execute the task correctly in the expected time.

40% (2) use the resources provided correctly.

Taking as a reference the above-mentioned background, it can be corroborated that there is a predominant low level of development of social skills, learning limitations and manifestations of euphoria or frustration in the face of difficulties in executing their tasks, which ratifies the need to solve these deficiencies effectively, so that the proposal of didactic materials for cognitive stimulation is conceived as an intervention strategy.

Once the intervention proposal and the evaluation and monitoring techniques of the cognitive processes and functions to be stimulated have been used, the following observations are made:

It allowed minimizing and delaying in some cases the damaged functions, and in others training disused skills.

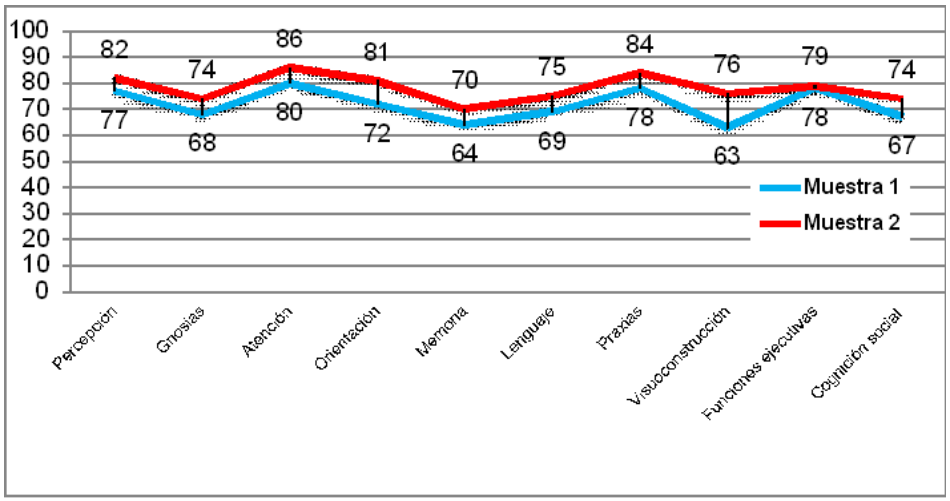
Motivate subjects on the basis of openness to change and conflict circumstances, increasing plasticity and coping mechanisms.

In some cases, resistance was shown in the development of activities due to frustration in the performance of tasks with high levels of difficulty, making it necessary for the person in charge to modify the pre-established strategies so that the subject could go through the levels of each exercise.

The sample was able to participate in most of the activities with a high percentage of participants who were motivated and interested in the tasks.

As a final result, it was possible to improve the indicators and stimulatory enhancers assisted through the implementation of the proposal, and the cognitive functions and processes of each of the participants were stimulated at the physiological, psychic-cognitive and social levels.

Source: Descriptive Psychopedagogical Test

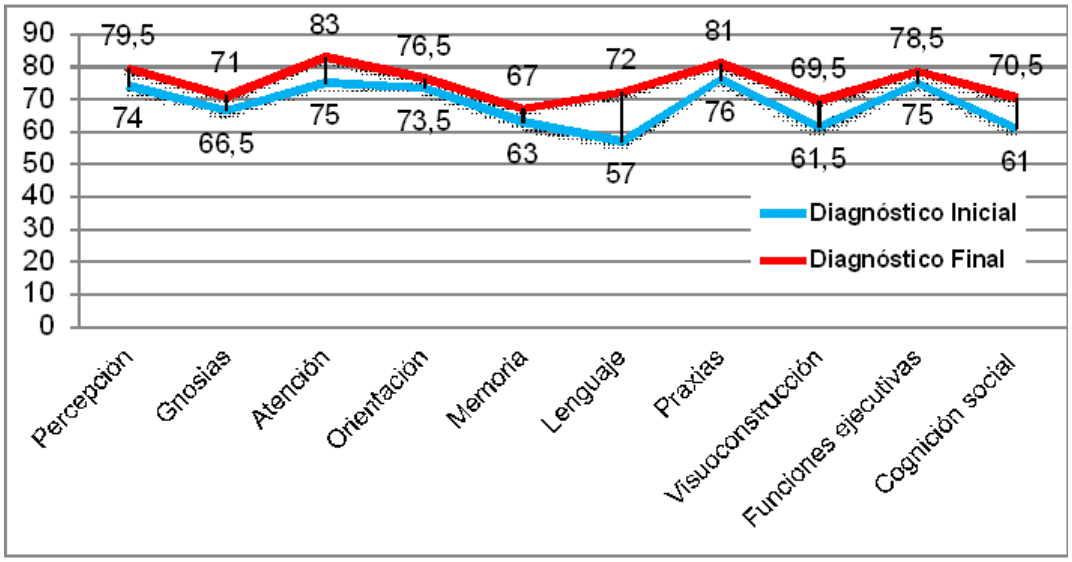


Graph 2: Results obtained per sample during final diagnosis

In the comparison study by performing the proposed exercises, the following observations could be established in the sample:

It allowed minimizing and delaying in some cases the damaged functions, and in others to train disused skills. Motivating the subjects on the basis of openness to change and conflict circumstances, increasing plasticity and coping mechanisms. In some cases, resistance was shown in the development of activities due to frustration in the performance of tasks with high levels of difficulty, making it necessary for the person in charge to modify the pre-established strategies so that the subject could go through the levels of each exercise. The sample was able to participate in most of the activities with a high percentage of participants who were motivated and interested in the tasks. As a final result, it was possible to improve the indicators and stimulatory enhancers assisted through the implementation of the proposal, and the cognitive functions and processes of each of the participants were stimulated at a physiological, psychic-cognitive and social level.

Source: Descriptive Psychopedagogical Test



Graph 3: Comparison of the results obtained in the initial and final diagnosis.

Conclusions

As has been established in the previous fundamentals, cognitive stimulation cannot be conceived as an isolated process, but as an interactive and dynamic process in which each of the personal and non-personal components of psychotherapeutic activity intervene and interact, It implies the participation of a multidisciplinary and interdisciplinary work team that promotes intervention strategies with a globalized method of direct and indirect stimuli to improve the individual's performance in daily life and to achieve a coherent interaction between the biological, psychological and social factors that influence the subject from the biopsychosocial model.

The intervention proposal meets the indispensable requirements of promoting the leading role of the participants and adjusts to their diagnostic characteristics and cognitive particularities. The didactic materials designed privilege the use of technology through playful exercises, which make the child feel interested in the activity and pay more attention to the exercise, because the quality of the resource, its graphic interface, environment and flexibility, stimulate curiosity for the next activity. In addition, it becomes a more dynamic and easier work resource than the tasks implemented with paper and pencil, without replacing the traditional elements of practice. Likewise, the contents used in the materials, respond to the contents of the cycle and grade that allow

the quality of the process of acquisition and consolidation of learning; taking into account the specific needs and preferences of the cognitive period of the sample, integrating novel elements that encourage the transition to independence and autonomy of individual work, strengthening and creating new personal and social skills.

With this approach, individuals who present some deficit or limitation at a cognitive, motor, behavioral and/or emotional level that prevents them from performing significantly in their personal, academic and/or social development; through this type of treatment, new learning strategies can be established that will allow the subjects to readjust and restructure their functional levels with a developmental approach and, consequently, reduce - to the extent that their abilities allow - the affectations presented, achieving a better state of health and quality of life in their daily lives.