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Tools for Objectifying Motor Assessment and Functional Adaptability of Children with SEN in Special Education

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Abstract: *The motric activities for children who have special educational needs (SEN) are adapted and individualized to their deficiencies. It is also considered that the development of motor skills facilitates their participation in various educational activities carried out at school, thus providing some learning opportunities. The article analyzes the way motor abilities influence the children with SEN in the school adaptation. The research was conducted between January and February 2022 at the School Center for Inclusive Education Braşov (Romania). The study included 8 subjects with intellectual disabilities (ID) and associated disabilities, with an average age of 5.8 years (SD = 1.3). The motor skills test was performed by applying Movement Assessment Battery for Children, Second Edition (M ABC-2), using evaluation items for balance, manual dexterity and for throwing and catching objects. School functionality was assessed by the School Function Assessment (SFA), through which the ability to perform the physical and cognitive-behavioral tasks of the children concerned was determined. The results obtained showed a significant connection (r= .934) between the variable of motor skills and the variable of school functionality, which leads us to conclude that motor skills can improve the functional adaptation of children with SEN to activities in the school environment.*

Keywords: *special education needs; motor skills; special education.*

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Introduction

Children who have special educational needs (SEN), educated in special education units in Romania, have difficulties in individual development with an impact on cognitive, psychomotor and socio-emotional development. These children are diagnosed with intellectual disability (ID) and benefit from educational-therapeutic services provided by special education institutions for social integration, and recovery programs are adapted to the associated deficiencies, respecting individual developmental characteristics (European Commission, 2022).

ID is a disorder that occurs in the early phases of development of the individual, being characterized by difficulties in adaptive and intellectual function, manifested in the conceptual, practical and social. The diagnosis of ID is made only if in the period of growth and development are identified intellectual deficits such as reasoning, abstract thinking, problem solving, learning etc., but also adaptive deficits that affect daily activities, communication, personal autonomy, independence from others, etc. (American Psychiatric Association, 2013). The children diagnosed with ID have delays that affect growth and development (Fegan, 2011), there is also a deficit in the brain, which affects the motor and cognitive field (Ashori et al., 2018).

Children that suffer because of ID have a delay in motor development, the level of motor skills being lower than typical (healthy) children (Rintala & Loovis, 2013; Maïano & Hue, 2019). Motor impairments are associated with delays in cognitive, socio-emotional and behavioral development (Rodriguez et al., 2019), affecting personal autonomy and participation in social, educational and daily activities (Alesi et al., 2018).

Severe motor deficits are usually identified by the age of 2 (Griffiths et al., 2018), and mild deficits are evident later, when children attend kindergarten and school, when they are exposed to more complex tasks, performing them more difficult than their mates (Griffiths et al., 2018; Hirata et al., 2021).

Cognitive development is based on motor development, with a link between these two components (Hartman et al., 2010; Jeoung, 2018). Motor development can mediate the relationship between cognitive and social skills, because motric activities involving the improvement of motor abilities involve their development in a framework that facilitates the practice of social interaction and communication skills (Liu & Breslin, 2013).

The development of general motor skills, but especially gross mobility, allows children to explore the environment in which they are, to adapt and respond to a wide range of stimuli, thus contributing to increasing

the degree of functionality during daily activities. The expansion of motor skills is essential for involvement in physical and sports events adapted to the motor potential, contributing to growth and development (Simons et al., 2008; Downs, 2020; Jeoung, 2018), improving health and fitness at older ages (Griffiths et al., 2018).

The early development of gross motor skills influences the level of cognitive acquisition at school age, especially in terms of mental processing speed and working memory. These cognitive functions play an important role in human learning and development (Piek et al., 2008; Buzescu et al., 2021).

From the point of view of cognitive development, speech skills, mental processing speed, attention, spatio-visual skills, but also the capacity of the executive function are mainly affected. The executive function includes cognitive flexibility, the ability to inhibit (self-control) and working memory, contributing to the adaptation of behavior to achieve a goal (Klotzbier et al., 2022).

There are deficits in sensorimotor function, and motor capacity is reduced, being especially affected by control, accuracy and speed of movement, which influence the ability to manipulate objects and postural control (Klotzbier et al., 2022; Jeoung, 2018).

Specialists, families and carers must pay special care to the physical activities adapted to the degree of intellectual disability of each child. It is essential to encourage the development of motor skills by adapting activities to the motor potential (Wouters et al., 2019).

In the pre-school age, in the case of children with ID, mental health monitoring and motor deficit identification through appropriate assessment tools is an important step in supporting them and their families (Griffiths et al., 2018; Hirata et al., 2021; Mijaică & Balint, 2013).

The purpose of this research is to emphasis the connection between the motricity development of pre-schoolers with SEN and their ability to adapt functionally to perform activities in the school environment, using specific tools of objective assessment.

Methodology

The research was conducted between January and February 2022, in the School Center for Inclusive Education Brașov (Romania), which is the special school where the subjects from the study are educated. The studied group consists of 8 subjects with moderate ID, with an average age of 5.8 years (SD = 1.3), aged between 4.3 and 5.9 years. Their distribution according to gender is equal, including 4 boys and 4 girls.

For this study, the written consent of the special education institution where the research took place was obtained. Parents or legal representatives signed an agreement form informing them of the purpose of the research and the possible risks involved in this study, the participation of children in the study being voluntary.

The results obtained were converted into values provided by the user manuals/guides for each test applied. The data obtained and the results were processed using version 22 of the Statistical Package for Social Sciences (SPSS).

Movement Assessment Battery for Children, Second Edition (M ABC-2) was applied for perform this study to assess motor skills and School Function Assessment (SFA) was applied to assess functional adaptability. The tests are purchased from Pearson (UK) and are approved for use in testing children with SEN.

M ABC-2 is a battery of tests to identify motric deficits in children aged 3 to 16 years by assessing 3 areas of interest: aiming and catching an object, manual dexterity and balance, (Henderson et al., 2007).

The M ABC-2 provides standardized scores for the 3 areas, and their sum gives a total score. The assessment tool includes 8 assessment items for testing motor skills. For this study, the results obtained were recorded in the registration form for the age of 3-6 years.

Manual dexterity comprises three tests:

• *Posting Coins* test, consists in inserting with one hand some plastic coins in a container provided with a hole;

• *Threading Beads* test, is a timed task that consists of stringing beads on a string provided with a metal end;

• *Drawing Trail* is a non-timed task that involves drawing a route on a worksheet.

Throwing at a target and catching an object consists of two tests:

• *Throwing Beanbag onto Mat* test involves throwing a bag at a fixed point on the ground;

• *The Catching Beanbag* test involves holding the bag with both hands.

Static and dynamic balance is evaluated by:

• *One-Leg Balance* test, consists in keeping the body in balance on one lower limb;

• *Walking Heels Raised* test, consists of covering a distance of 4.5 m on a line drawn on the ground, stepping on it with one foot in front of the other;

• *The Jumping on Mat* test consists of making successive jumps with both feet from one colored square to another.

SFA is a questionnaire that assesses the functional performance and involvement of children in school activities (Coster et al., 1998).

The SFA is aimed at pre-school children up to the age of 12 and consists of three parts that assess participation in various activities in the educational environment, homework assistance and the child's performance in educational activities.

The data of the questionnaire were completed by the members of the multidisciplinary team (psycho-pedagogue, physiotherapist, educator) who provide educational-therapeutic or assistance services to the subjects included in the study.

The score obtained was converted into a criterion score that is between 0-100, where the value of 100 represents the maximum level of functionality achieved by the child for that area.

Results

The subjects of the study are educated in the special education unit and have special educational requirements, diagnosed by specialists with moderate intellectual disability and associated deficiencies. From the studied group, 7 subjects have autism spectrum disorders, and one subject has disorders in neuro-motor development.

By applying the SFA questionnaire, it was observed (Table 1) that the investigated pre-schoolers have a better functional adaptability in performing physical tasks in educational activities, compared to the cognitive-behavioral tasks they have to perform.

Table 1. The results obtained for each part of the SFA

SFA		Criterion Score	
Components	**Items**	**Mean**	**SD**
Part I			
Classroom participation	Participation in the special education class/group	51.50	3.78
Part II			
Support for children in completing tasks	Physical tasks	53.38	6.25
	Cognitive-behavioral tasks	36.50	4.17
Part III	*Physical tasks*		

Children's performance in activities	Movement	67.63	3.96
	Maintaining and changing posture	64.75	3.61
	Recreational motor activities	50.63	3.77
	Object manipulation	54.75	2.96
	Using tools and materials	51.88	2.32
	Arranging and organizing the space	55.63	3.46
	Drinking fluids and eating	54.00	1.77
	Clothing management	58.50	1.60
	Hygiene management	51.75	2.12
	Going up and down the stairs	51.00	2.77
	Cognitive-behavioral tasks		
	Memory capacity and understanding	49.25	3.53
	Functional communication	39.38	2.44
	Respecting social norms	41.88	2.53
	Compliance with adult and school guidelines	52.63	1.40
	Behavior and completion of tasks	48.00	1.51
	Interaction with others	47.50	3.33
	Behavioral adaptation	45.75	2.43
	Awareness of personal care	48.38	2.82
	Safety awareness	43.13	3.09

Thus, in the first part of the SFA, the subjects obtained a criterion score of 51.50, representing an average degree of functionality in participating in activities specific to the educational environment in the special education classes they belong to (Figure 1).

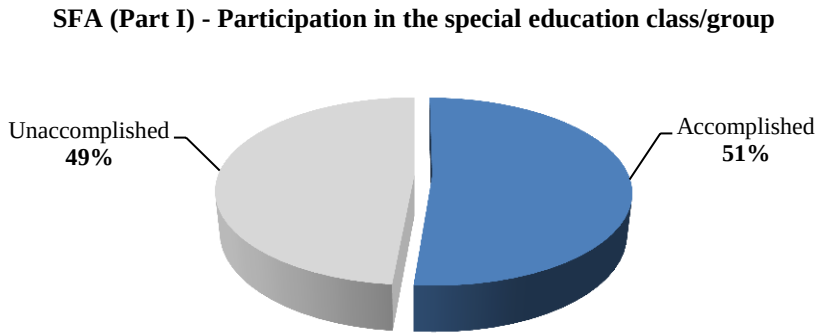

Figure 1. Participation of children in the special education class/group (SFA, Part I)

In Part II, the ability of children to perform tasks with the help of educators/therapists was assessed, thus obtaining better results (53.38) in physical tasks (Figure 2), compared to cognitive-behavioral tasks (36.50) which are performed at a low level of functionality (Figure 3).

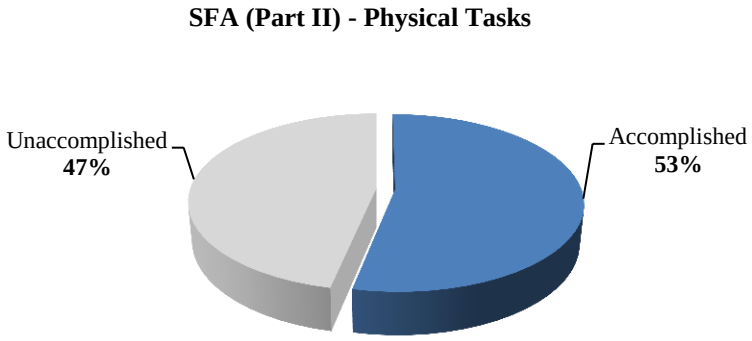

Figure 2. Fulfillment of cognitive-behavioral tasks by children with support (SFA, Part II)

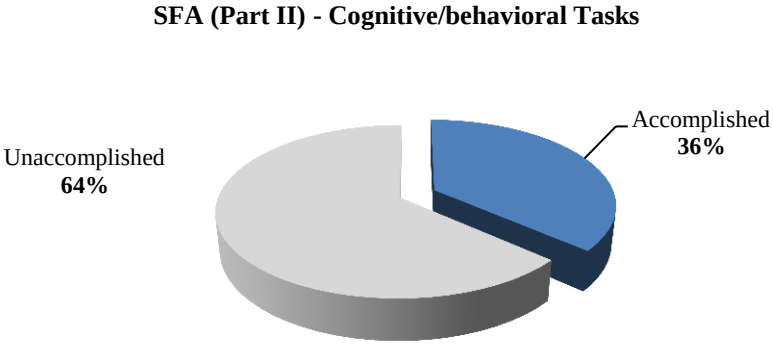

Figure 3. Fulfillment of physical tasks performed by children with support (SFA, Part II)

In Part III of the SFA, the results obtained show that the performances in performing physical tasks are better, compared to the cognitive-behavioral ones. The higher scores obtained on the range (67.63) and the movement from different positions and positions (64.75) demonstrate a good ability of the subjects to explore the environment in which the educational activities are carried out (Figure 4).

In the daily activities that include feeding and feeding with liquids (54.00), clothing (58.50), personal hygiene (51.76), the values of the scores obtained represent an average capacity to perform these tasks.

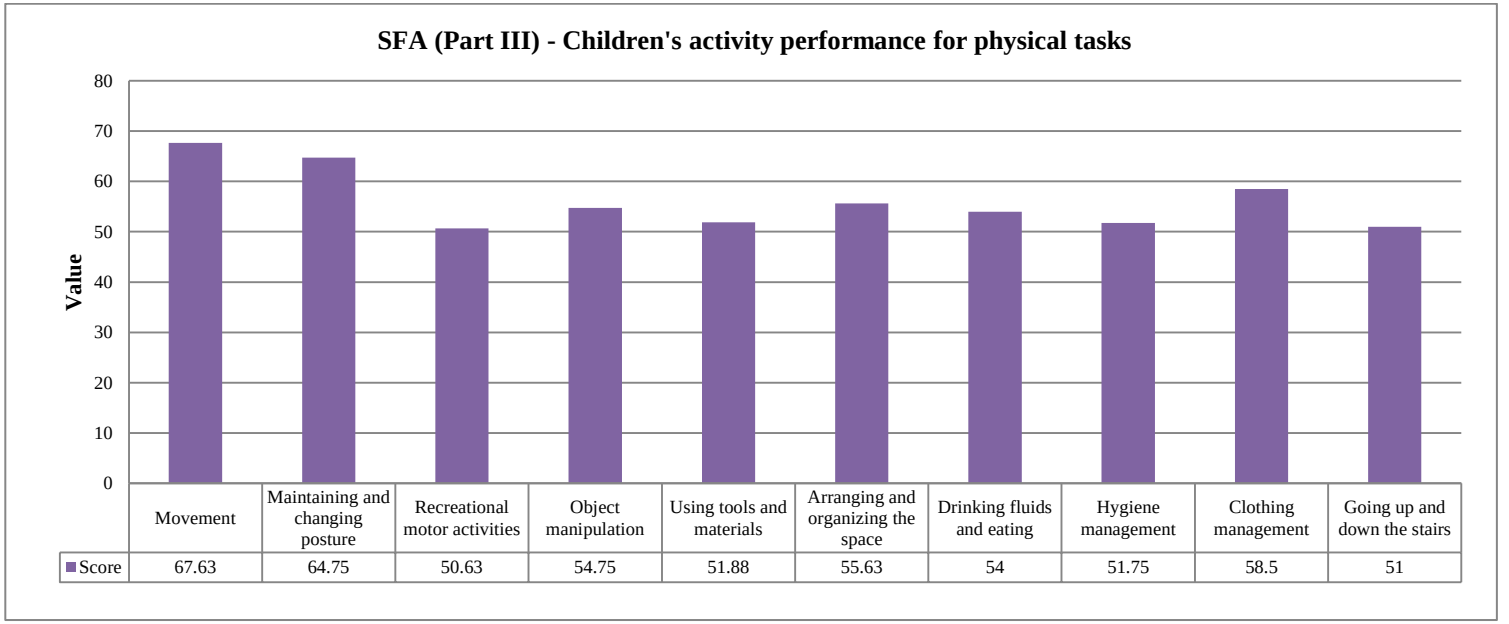

Figure 4. Activity performance with physical tasks in Part III (SFA)

Activities involving gross and fine motor abilities, for exemple the use of tools/instruments (51.88), handling of objects (54.75), the arrangement of the workspace (55.63) and participation in recreational motor activities (50.63) are performed at an acceptable level of performance.

Cognitive-behavioral tasks are performed at a low level of performance, a situation related to the fact that subjects are diagnosed with intellectual disabilities (Figure 5). Also, the low value of the score obtained in functional communication (39.38) is influenced by language disorders and the specificity of the associated deficiencies of the subjects included in the study. On the other hand, there is a higher value of children in adapting to the instructions of adults and in observing school rules (52.63), this being influenced by the adapted way of communication between subjects and educators/therapists. Being an average value, the score indicates that it is necessary to adapt the rules and instructions provided by adults, depending on the children's ability to understand.

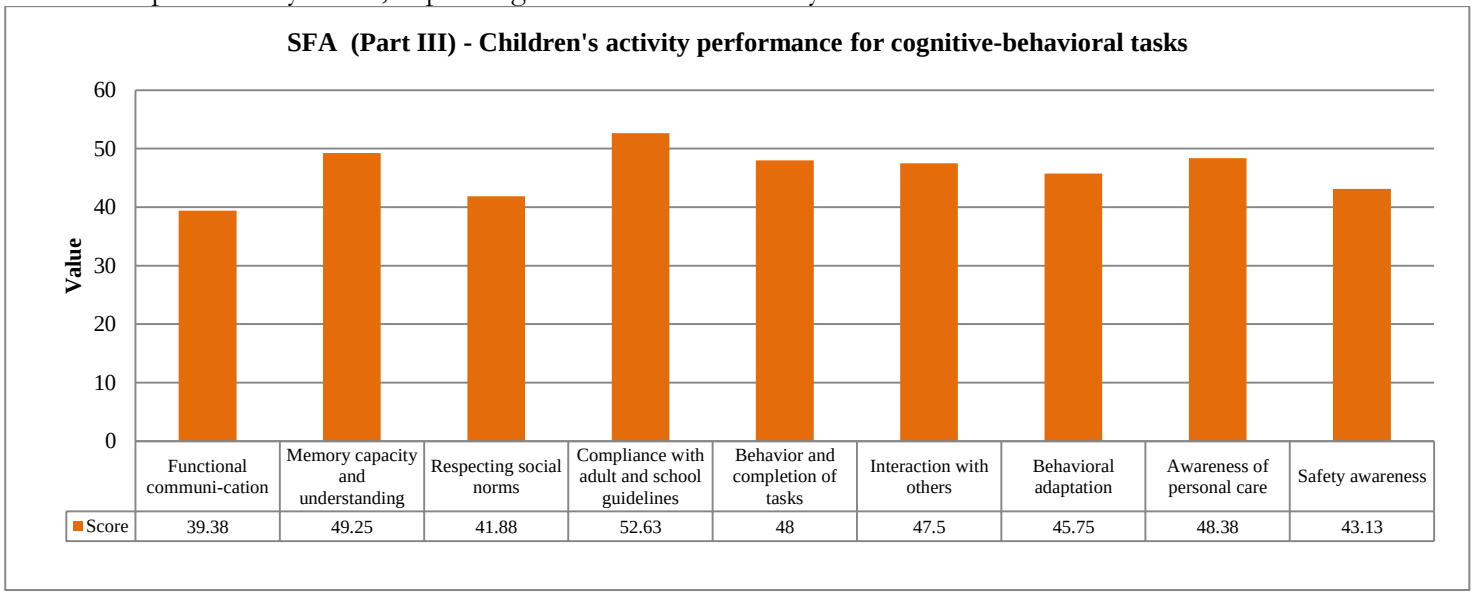

Figure 5. Activity performance with cognitive- behavioral tasks in Part III (SFA)

The values obtained by the observance of the social norms (41.88) by the subjects, indicate the fact that they have a reduced capacity to adapt the behavior according to the situation in which they are. The low level of safety awareness (43.13) demonstrates the need for close supervision by adults during educational activities.

The low values obtained for comprehension and memory (49.25), for adapting behavior in performing tasks required by adults (48.00), but also the interaction of subjects with classmates (47.50), show that it is necessary to adapt teaching-learning methods in educational activities and the intervention of specialized therapists to remedy these deficiencies.

In the case of motor assessment (Table 2), difficulties were identified in all motor areas assessed. This expresses the movement difficulties specific to subjects with ID, a feature that influences motor development, negatively influencing the functional capacity to participate in educational activities.

Table 2. Results obtained for components of the M ABC-2

M ABC-2		**Item standard score**		**Component Score**			
		Mean	SD	Percentile (%)			
Components	**Items**			Mean	SD	Minim	Maxim
Manual dexterity	Threading Beads Posting Coins Drawing a Trail	3.00 5.50 2.88	1.77 3.16 3.48	2.43	3.05	0.5	9
Aiming and catching an object	Catching Beanbag Throwing Beanbag into Mat	5.50 7.88	1.77 0.64	14.75	11.47	5	37
Balance	One-Leg Balance Jumping on Mat Walking Heels Raised	9.38 7.75 5.88	1.99 3.05 1.64	18.37	18.36	9	63

The results of the manual dexterity assessment (2.43) express the deficits in fine motor skills that pre-school children generally face with SEN. Fine motor skills are assessed by tests involving tweezers and grasping, actions that influence the use of tools, personal care skills such as dressing, closing and opening buttons, etc. The development of fine motor skills contributes to increasing the capacity for self-care and personal autonomy.

Higher values, but below the average level, were obtained at static and dynamic balance (18.37), which expresses that the targeted subjects have a good ability to maintain positions and positions in static and dynamic physical activities, and more complex motor activities are performed with difficulty, requiring the assistance of therapists and educators.

The coordination of the upper limbs, which in our case involves throwing and catching objects (14.75) are rated at low values, because the speed of execution and accuracy of movements is limited, which requires activities to accommodate children with the object and the proposed task.

Table 3. The correlation between the motor skills variable and the school functional adaptability variable

		SFA	M ABC-2
SFA	Pearson Correlation	1	.934
	Sig. (2-tailed)		.001
	N	8	8
M ABC-2	Pearson Correlation	.934	1
	Sig. (2-tailed)	.001	
	N	8	8

The values obtained by the subjects, following the application of the tests, showed that there is a significant connection (r =.934) between the variable of motor skills and the variable of school functionality, which leads us to conclude that the directed development of motor abilities can be an essential factor in the functional adaptation of preschoolers to educational activities (Table 3).

Limits and Discussions

The educational-therapeutic activities, carried out by children with SEN in special schools, must be adapted to their level of development. Even if these children are of similar age and are included in the same class, they show individual developmental features, there are differences in cognitive, socio-emotional and motor development (Vuijk et al., 2010).

The use of M ABC-2 for motor assessment shows that the low results for manual dexterity (2.43) obtained by the subjects included in the study demonstrate that activities involving fine motor skills require a higher cognitive demand (Vuijk et al., 2010), compared to the other evaluated motor areas, where better values were obtained at equilibrium (18.37) and when throwing and catching objects (14.74).

The involvement of children in motor activities adapted for the purpose of motor development, stimulates their cognitive and socio-emotional capacity, positively influencing the level of functional adaptation to the tasks performed in the educational environment.

SFA is a standardized assessment tool that measures the functional performance of children in educational activities, by using assessment items for physical, cognitive and socio-emotional tasks. Objective assessment of the functional adaptability of students with SEN is an important element to provide educational services tailored to the level of development of each child (Kim et al., 2021).

Through the use of SFA, in the second part there is a low level of fulfillment of physical tasks (53.38) and cognitive-behavioral tasks (36.50), students needing support from specialists in performing school tasks. This influences the functional performance of children, in the third part of the test being identified low values in some items such as functional communication (39.38), memory and comprehension (49.25), affecting the capacity for personal autonomy and independence from specialists who provide services educational and therapeutic, but also to their family.

M ABC-2 and SFA are objective assessment tools that can be used in the design of educational-therapeutic activities adapted to children with SEN, diagnosed with ID, to streamline teaching and therapeutic methods and means, in order to cultivate the potential of each child in special education, facilitating integration their social status.

The limitations of the study are provided by the fact that the research took place in a single educational unit and the number of subjects included in the research is low.

Conclusions

Following the assessment of motor skills, a reduced capacity for fine motor skills involving manual dexterity is observed (2.43), with better results being obtained in motor activities that involve maintaining static and dynamic balance (18.37). This situation expresses the need to improve gross motor skills for influence the development of fine motor skills through therapeutic activities adapted to the degree of cognitive development and motric skills of children.

The correlation ($r = .934$) between the variable of motor skills and the variable of school functionality, demonstrates that motor activities adapted to the level of development of subjects, can increase the degree of functionality of children with SEN in educational activities, thus contributing to the growth of cognitive and socio-emotional skills by

increasing the degree of personal autonomy and independence, facilitating the process of social integration.

The results obtained by subjects who perform physical (53.38) and cognitive-behavioral (36.50) tasks in educational activities show that there is a need for ongoing support from specialists and families to support children with SEN so that children can perform the proposed tasks and develop their functional performance.

In order to design an individualized educational-therapeutic program for children with SEN, diagnosed with ID, special education specialists need specific tools for objective assessment of the motor, socio-emotional and cognitive field, and in this situation the M ABC-2 and SFA tests are recommended.

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