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PH. D. THESIS
- abstract -

DYNAMIC ASSESSMENT OF THE ZONE OF PROXIMAL DEVELOPMENT IN PRIMARY SCHOOL CHILDREN WITH LEARNING DIFFICULTIES

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CONTENTS

INTRODUCTION AND OBJECTIVES OF HE THESIS

The actuality of the studies in this thesis id determined by the theoretical evolutions in the field of cognitive psychology, applied to the assessment of the cognitive functioning. It is determined, also, by the extreme increasing of the groups of students with decreased school performances at the basic school disciplines (according to the Pisa evaluations).

The theoretical evolution regarding the research of the genetic, social and economic determinants of the cognitive development sheds new light upon the interpretation of the different levels of cognitive functioning and their relations with the school performance (Sternberg & Grigorenko, 2001, 2002). These re-interpretations of the interactions of the genetic – hereditary factors and socio-cultural and economical environmental factors had a notable impact upon the assessment and interpretation methods of the cognitive functioning and upon the elaboration of assessment instruments based on these theoretical approaches.

The introduction in the theoretical constructs of the cognitive functioning of the concepts of distal and proximal factors and their role in determining the development of intelligence, the cultural differences and deprivation, the concept of parenting, the role of schooling, the discrepancy between the manifest school performance and the real intellectual ability determined the appearance of new theoretical models, which, opposite to the classical theories of intelligence, consider the summative role of these determinants of the cognitive functioning.

Theoretically, these evolutions had an exquisite impact upon the re-considering of the modifiability of the cognitive system, influenced by some systematic interventions with a facilitating role in the development of intelligence. The theory of Cognitive Modifiability (CM) and the theory of Mediated Learning Experience (MLE), developed by Reuven Feuerstein, based on the socio-cultural development of intelligence of L.S. Vigotsky (1978, 1986) and the theory of operational development of intelligence of Jean Piaget (1965), translated into the

practice of cognitive assessment through the Learning Propensity Assessment Device (LPAD) and the Instrumental Enrichment (IE) elicited researches based on the evaluation of the cognitive modifiability. These studies Feuerstein, R. et al., 1977,1982; Tzuriel,D.1991; Lidz,C. 1987; Haywood, H.C. et al.,1992; Lebeer, J, 2005) are demonstrating that the cognitive system can be developed throughout mediated learning experience and by exposing the child with deficient cognitive functioning to the actions of structured proximal factors. The gained cognitive profit will be reflected in the increased intellectual efficiency.

The main goal of the thesis is to demonstrate - throughout experimental data – the conceptual and practical validity of the theory of dynamic assessment of intelligence, considered as complementary to the psychometric method in assessing cognitive functioning. The thesis also emphasizes the effects of the mediated learning in school context in determining cognitive development.

Theoretical objectives

The studies of the thesis aim to demonstrate - throughout experimental data – the following:

The theoretical objectives are aiming the construction of a coherent interpretative model regarding the evidencing –throughout psychometric and inter-active diagnosis tools – of the factors that determine the learning disabilities. The comparative analysis of the assessment methods allow the identification of the values and limits of these procedures in offering information regarding the planning of formative interventions.

The second theoretical objective represents the argumentation regarding the complementarity of the two assessment methods of the intellectual level. There are experimental data demonstrating that the approach to deficient cognitive functioning from the perspective of dynamic assessment reveals cognitive mechanisms which are not accessible to the psychometric methods.

Methodological objectives

The main methodological objective of the thesis is to develop a synthetic model of evaluation of the deficient cognitive functioning combining psychometric data with data gained from applying dynamic assessment instruments.

Practical objectives

The practical objective of the thesis represents the operationalization of the cognitive system within an evaluation and restructuring intervention system. The assessment of the cognitive functioning in the real context of schooling confers to the gathered information a higher ecological validity comparing to those resulting due to the psychometric evaluation.

Key words

Dynamic assessment, learning disabilities, zone of proximal development, educability coefficient, cognitive modifiability, intellectual potential, cognitive profit, distal factors, proximal factors

Chapter I
THEORETICAL BASIS OF THE DYNAMIC ASSESSMENT

Zone of proximal development

The literature referring to the activity of the Russian specialist associates his name to the most influent concept developed: the zone of proximal development, which - in terms of theoretical implications and research directed to determine the developmental mechanisms of the cognitive system – determined fundamental evolutions (Brown, A.L., French, L.A. 1979; Brown, A.L., Ferrara, R.A., 1985). The immediate purpose of this sub-chapter is not to analyze Vigotsky's psychology, but to present and analyze the contributions which lead to the appearance of a new assessment method of the development and intellectual functioning of the child and which determined a new orientation in interpreting the development of intelligence.

The elaboration of the notion of zone of proximal development (ZPD) originates in a simple observation made by L.S. Vigotsky, regarding the analyze of the psychometric assessment tests of intelligence, applied to children (Wertsch, 1984). Vigotsky emphasized, that the school results of these children didn't reflect the level of cognitive functioning represented by the intelligence quotient (IQ). Vigotsky's conclusion was that the IQ index is not predictive to the later school performances.

Vigotsky launches the concept of present cognitive development and proximal development. He emphasized that the psychometric tests, throughout the IQ index, are reflecting more the level of the present development, and the assessment procedures of the proximal level or potential of development would affect the student's intellectual potential.

Vigotsky defines the zone of proximal development as „the distance between the present level of the cognitive development, manifested by the child's independent ability in solving the problem, and the potential level of development that he can reach, under the guidance of an adult or in collaboration with a competent peer" (Vygotski, 1978).

The concept of zone of proximal development contains several defining elements, which will constitute the method of assessment of the intellectual potential created by R. Feuerstein, Y. Rand and M. Hoffman (1979), such as: the element of inter-action between the child and the adult or a competent peer (mediation), and the notions of activity and internalization.

The method of diagnosis of the zone of proximal development, created by R. Feuerstein and co. (Guthke,1982, 1992; 1993; Guthke & Wingenfeld, 1992; Brown & Campione, 1992; Carlson & Widel,1980,1992 Klauer, Lidz C.S.1987, 1987; Tzuriel, D., 2001, 2014) is based on the mediated interaction between the child and the assessor in the mutual activity of forming cognitive instruments, which allow the acquisition of new competencies belonging to the zone of proximal development. This orientation, known as „the school of action", defines - in Vigotsky's view – forming the complex cognitive processes, as interiorized action throughout the mechanism of learning.

Vigotsky, throughout the zone of proximal development, defines learning as a mediated activity, which produce changes in the cognitive structure, by interiorizing external actions. Following these theoretical considerations, Vigotsky sustains that the zone of proximal development reflects more correctly the level of learning potential, thus is a more valid predictor of the school success, than the intelligence quotient obtained by applying psychometric tests.

Based on the cultural-historical mechanisms of the development of higher cognitive functions present in the zone of proximal development, Vigotsky suggests a re-conceptualization of the concept of intelligence, both as its structure, and as it's mechanism of development, and nevertheless, considering its evaluation methods.

For the evaluation of the cognitive development of the child, Vigotsky suggests a two-step procedure: in the first phase the mental age is determined with classical, psychometric methods, as indicator of the development of the higher cognitive processes, due to the

unstructured interaction with the socio-cultural environment. This level, according to Vigotsky, highlights the „mature" functional cognitive processes.

In the second phase, exposing the child to problem-situations - which shall be solved throughout mutual, mediated action with an adult or a competent peer -, it can be observed the highlight of the evolving/developing cognitive processes, which belong to the zone of proximal development. Vigotsky (1986) indicates four main procedures for determining the cognitive processes in the zone of proximal development: the adult, who mediates the problem-situation, demonstrates the problem solving method and follows if the child can imitate the solving procedure. The imitation, according to Vigotsky, is an incipient form of the mediated learning, and ensures, in early ages, the internalization of the „cognitive instruments" in the zone of proximal development. The second method of diagnose of the zone of proximal development is to start to solve a problem, the mediator following how the child continues to solve the task. Vigosky sustains that the assisted or mediated mutual activity is the attribute of the developing cognitive processes, which, at compartmental level, manifests in the acquisition of new competences (Das & Conway, 1992). I.P. Galperin (1989), representative to the Russian action school, elaborated the theory of planned mental action forming. According to this theory – which is the basis of a modelling intervention of the higher cognitive processes, by inducing logical structures (Arievitsch & Van der Veer, 1995) – is a mental action or a concept, which is formed through the planned action, executed in four phases: the insurance the motivational level, the elaboration of the precise goals of the intervention, the elaboration of the external instruments and of the cognitive instruments which will insure the internalization of the action and the appearance of the logical operations and the finalization throughout exercises of the induced cognitive functions.

The third modality of assessment of the developing cognitive functions is by systematically observing of the child's action modalities, under the guidance of a competent

peer (peer mediation). Reasearches (Shamir & Tzuriel, 2004, Shamir, Tzuriel & Rozen, 2006, Tzuriel & Shamir, 2007) demonstrated the efficiency of the mediating interventions of an older and more competent colleague.

The fourth assessment method, indicated by Vigotsky, is the mediation by an adult, only with verbal tools (no materialize action) of the main characteristics of the task to be solved and the analyzed, along with the child, of the possible solving paths. For Vigotsky these independent solving behaviors are the descriptors of the cognitive functions in the zone of maturation, belonging to the zone of proximal development.

A.N. Leontiev (in Karpov & Gindis, 2000), student of L.S. Vygotski, sustains that the higher cognitive processes are forming throughout the internalization mechanisms of actions which are isomorph with the structure of the cognitive activity. According to the theory of emergence of the cognitive processes, throughout the internalization of an extern isomorph action, any mental action is to be executed first as a materialized action. For example: learning the notion of number – meant to describe an abstract concept – is executed concretely materialized.

J. Piaget and the clinical method of assessment of the operational level of intelligence

The method of assessment of the cognitive functioning, used in Piaget's and Inherlder's researches (Boom, 2009),, and also by the representatives of the Institute of Genetic Epistemology in Geneva is the clinical method and represents o combination between the observation of the child and the elements of the psychological experiment. The permanent dialogue with the child, within the limits of the cognitive task, the adaptation of the questions of the researcher according to the solutions proposed by the child, with the main function to highlights the logical structures, which determine the answer.

The researcher induces actions, in order to determine de cognitive contradictions between the perceptive data and the child's logical deductions. Piaget (1965, 1973), in

grounding the clinical method, starts from two basic assumptions: the psychometric test, which expect from the child correct or wrong answers does not offer information on the logical steps, which determine the answers. Piaget (1965) considers that the analysis of the wrong answers are offering valid information on the level of cognitive functioning. The second observations refers to the introduction in the process of interaction with the child of logical elements, which have pro-active characteristics, that allow the knowledge of the present logical operations at different levels of cognitive development. We have to notice that the clinical trial is conditioned by the researcher. To eliminate this negative element, Longeot şi Nassefat (in Boom, 2009) developed a method on which the distinct method of dynamic diagnose of the cognitive functioning is based (Brown & Campione, 1986).

The analysis of the clinical method reveals close connections to the dynamic assessment methods: 1) in the course of the interaction having a mediation character the mediator can generate problem-situations, which are offering information regarding the cognitive processes in the zone of proximal development; 2) the assessor has a list of pre-established questions, which, depending on the received answers, can be re-modelled in order to mediate knowledge and to form the necessary cognitive instruments to solve the presented task; 3) the researcher and the assessor, throughout the analysis of the answers, can facilitate the elaboration and review process of the subject, regarding the hypothesis which are deducted from analyzing the task (Inhelder, Sinclair & Bovet, 1974) .

Piaget (1929), analyzing the clinical interview protocols of the children in different staged of development of intelligence, identified five types of answers, which reflects the operational level of intelligence.

The first type of answers have of obviously random nature. According to Piaget, these are reflecting not the operational level of intelligence, but more likely the lack of motivation regarding the involvement in the task.

The second type of answers analyzed by Piaget have as mutual feature the redundancy and inadequate content for the presented task. In Piaget's opinion, these have a transitive character and are representing a preceding stage of adequate understanding of the task.

The categories of answers the child elaborates due to the suggestions of the researcher are interpreted as a consequence of his trials of satisfying the expectations. According to Piaget these answers doesn't reflect the operational level of intelligence.

The reasoned answers, which reflect the logical attempt of the child, according to Piaget (1965), are reflecting the ability to elaborate based on the data, of a logical, argued attempt. These answers are original, and they do not appear as a result of the suggestions of the researcher.

The clinical interview method, elaborated by Piaget (1965) was took over by the dynamic assessment for several reasons:

1. The representation of the cognitive functions throughout the clinical interview, according to the Geneva School, cannot be translated into quantitative results, and it doesn't target the selection;
2. The clinical method considers the individual differences according to the context of genetic maturation and the action of environmental factors which can be different at children of the same chronological age;
3. Based on the information obtained we can elaborate intervention schema centered on the cognitive processes in the zone of proximal development.

R. Feuerstein and the Mediated Learning Experience

According Piaget's theory referring to the stimulus – organism – response (S-O-R) model, the input acts upon the organism and produces an answer, doesn't consider de individual differences, which can be triggered by factors like parent – child mediation and family model.

Feuerstein criticizes this model and introduces in the above mentioned (S – O – R) model the human mediator S – **H** – O – R (H = human), fundamenting thus the Mediated Learning Experience (MLE) (Tzuriel, 2000).

According to this theory, MLE interactions are defined as a process in which the parents or the adult interpose himself between the stimulus and the human organism and alters the stimulus for the developing child (Feuerstein et al., 1979, 1980, 1987, 1988). In the mediation of the stimulus the adult can use different strategies to alert the child's attention: he can change the frequency, the order and intensity of the presented stimulus, linking to familial contexts, which confers them meaning. In the dynamic assessment (Haywood & Tzuriel, 1992) the examiner mediates the rules and strategies in order to solve a specific problem and to assess the level of interiorizing of the used rules and strategies in solving other tasks, with an increased level of complexity, novelty and abstraction.

Mediations are referring also to the motivational aspects by eliciting the curiosity and vigilance of the child, challenging him. From the cognitive point of view the mediator tries to improve and create new cognitive functions w the MLE processes are graduate interiorized by the child and become integrated mechanisms of child's changing cognitive system. The adequate MLE actions are facilitating the development of the different cognitive functions, new sets of learning (Haywood & Tzuriel, 2013).

The acquired and interiorized MLE processes allow the child's development and allow the child to benefit from the learning experiences, allow the self- mediation in new learning situations and to modify his own cognitive system. According to Tzuriel (2000), MLE strategies

emerging from a specific test situation help the examiner to facilitate the learning process, to identify deficient cognitive functions and to offer specific recommendations for the development of the cognitive structures.

Feuerstein perceives the MLE interactions as distal factors, which explains the individual differences in the cognitive modifiability and learning. Factors like organic deficit, poverty, LSES (low socio-economic status) and emotional disorders are considered as distal factors, which could relate on the learning abilities, but they affect the learning abilities only by the proximal MLE factor.

CHAPTER II.
STUDY 1. DYNAMIC ASSESSMENT OF LEARNING POTENTIAL OF THE CHILDREN WITH LEARNING DISABILITIES

Relevant researches on dynamic assessment applied to determine cognitive modifiability

The theories referring to the cognitive modifiability and mediated learning experience generated experiments having as common goal to check the applicability and effect of the method developed by Feuerstein at al. (Feuerstein & Rand, 1977).

The educational applications of the cognitive modifiability methods

Most studies were conducted in the USA and Israel. The Israeli studies were conducted with Yemenite and Ethiopian immigrants, and highlighted the mediational mechanisms of the culture upon the cognitive modifiability. These studies are originating in Reuven Feuerstein's activity between 1945/1946, when he worked with immigrant children of different nationalities.

The actions directed toward the recovery and integration into the dominant culture based the differentiation between the concepts of different cultural environment and cultural deprivation (Feuerstein & Krasilowsky, 1972, Feuerstein et al., 1980, 1999).

Using MLE on the population with sensorial deficits

Feuerstein's MLE was used in 1979 by Keane and Kretschmer, whom applied LPAD in hearing impaired children in order to assess their cognitive modifiability. At the experiment participated 45 hearing impaired children aged between 9 and 13. LPAD was applied in a test/ retest manner in order to determine the level of transfer.

Tzuriel and Caspi (1992) conducted a study regarding the applicability of the dynamic assessment in hearing impaired children, and they compared their result with the results of the children with no sensorial impairments.

Gouzman and Kozulin (1997, 2000) conducted researches with visually impaired children using Instrumental Enrichment for Visually Impaired. They concluded that the introduction of schematic images and processes helps to connect the learned patterns to English language and math. Based on this schema the teachers can elaborate a functional analysis of the different objects.

Kamarudin (2009) conducted researches in order to verify to what extend the dynamic assessment methods can be used in hearing impaired children in Malaysia and the SUA in order to enhance their narrative abilities.

Using MLE to develop language learning skills

Camilleri and Botting (2013) studied the use of dynamic assessment to learn receptive vocabulary. The participant was 15 preschool children, aged between 3 and 4 years old. 10 children were benefiting from speech therapy. The subject was assessed with the Dynamic Assessment of Word Leaning test. The researcher was interested in the ability to identify items and the ability to generalize when hearing a secondary item, and to retain specific items.

Bain et al. (1995) conducted a research referring to the extent to which the children with language difficulties respond to the adult's clues when pronouncing two consecutive words.

Hasson, Dodd and Botting (2012) developed the procedure called Dynamic Assessment of Sentence Structure to assess the children with language difficulties, who are characterized by a low performance in synthetics and sentence construction.

Using MLE in schizophrenic and elder population

Researchers conducted by Skuy (Skuy, M. et al., 1992) used experimentally the Learning Potential Assessment Device, designed by Feuerstein, in patient diagnosed with schizophrenia and young people diagnosed with severe behavior disorders.

Hadas-Lidor et al. (2001) watched the efficiency of the Feuerstein Instrumental Enrichment program in schizophrenic patients.

The dynamic assessment was applied also by Wiedl (2001) in schizophrenic and elder patients. The patients were assessed with the Wisconsin Card Sorting Test and the Verbal-Auditory Learning Test in order to increase the performance of the working memory. The results showed an increased validity in increasing the performance of the patients with schizophrenia and in the selection of the elder patient without dementia.

Sergi et al. study (2005) examined the extent to which the learning potential can have predictive value for the working abilities of the schizophrenic patients or patient with schizoid-affective disorders.

The use of the dynamic assessment instruments and of the cognitive development has two main objectives: the cognitive remodeling and the differential diagnosis of the children with learning difficulties presenting temporary delay in the cognitive development.

The cognitive remodeling throughout dynamic intervention (Wertsch, 1985, Kozulin, 2006, Tzuriel, 2000, 2001) has two mechanisms: the inter-subjectivity and the scaffolding. The inter-subjectivity represents the joint activity of two subjects targeting the mutual problem solving. The scaffolding means offering programmed external help to solve the problem, during the resolution of a cognitive task. During the mediation an adult with expertize offers relevant information for problem solving or restructuring and orients the information the child possesses (Henning et al.., 2011, Berk & Winsler, 1995).

Objectives and hypothesis

The main objective of the study is to examine the cognitive functioning of the children with learning difficulties in the context of exposure to constant and structured mediation intervention, comparing to the performance acquired due to the own randomized influences proper to school type learning. Most of the studies referring to the modification of the intellectual performance in the conditions of systemic and lasting exposure to stimuli provided by MLE determine the activation of the learning potential and the gain of cognitive profit typical to the level of normal cognitive development (Lidz, 1987, Lidz & Haywood, 2014, Tzuriel, 1999, 2001).

The main hypothesis of the study referrers to the existence of different levels of cognitive modifiability in the case of the children with learning disabilities and school failure.

Method and procedure

Participants

91 students were included, selected in based on the criterion of manifest learning problems and having – according to the criterion of discrepancy – considerable difference between the results on psychometric tests and the level of school performance.

Out of the selected children 60% (55 subjects) are male, 40% (35 subjects) are female. 77% of the subjects (70 subjects) are student in a school in Cluj-Napoca, with Hungarian language, 23% (21 subjects) are students in a rural school (Jebuc, Salaj county), with Hungarian language. 23 student from the sample (25%) are first graders, 21 (23%) are in the second grade, 24% (26%) are in the third grade and 23 (25%) are in the fourth grade. Average age M=9,44 (SD=1,25).

Instruments

The used psychometric test and the dynamic assessment instruments were selected based on the criterion of evidentiating the level of the actual cognitive development and the level of the potential belonging to the zone of proximal development. The applied psychometric tests were the Raven Progressive Matrix and the Marianne Frostig Test for the Developmental Test of Visual Perception. As dynamic assessment instrument the Cognitive Modifiability Battery - developed by David Tzuriel (1995a) - was applied.

The Raven Progressive Matrix was selected in order to realize one of the main objective of the thesis: to reveal the influence of the distal and proximal factors on the fluid intelligence, in order to facilitate it's development influenced by the proximal factors or to expose them in the presence of the masking phenomenon exerted by the proximal land distal factors.

Marianne Frostig Test for the Developmental Test of Visual Perception measures the level of development of the global visual perception based on five cognitive factors: eye-hand coordination, figure-ground, form consistency, position in space, spatial relations. The author M. Frostig (1966) demonstrates that visual perception is not a unitary integrative process of the visual information. The cognitive factors in the structure of the visual perception up to 12 years are unequally developed, determining learning difficulties. Frostig (1966) based on the data obtained by testing children aging between 4-12 years sustains that the studied perceptive factors have an independent development and are mostly involved into the process of learning to read and write. Considering the average age is 9,4 years, and the difficulties and the school performances manifested in this domain, the Marianne Frostig Test is considered, throughout the quotient of perception (PQ) is a good indicator of the manifest level of the efficiency of the perceptive processes.

Cognitive Modifiability Battery

The battery was elaborated by D. Tzuriel (1995a) by operationalizing the theoretical concepts of R. Feuerstein (1980) regarding the mediated learning experience and the structural cognitive modifiability. The battery was applied according to the basic paradigm of the dynamic assessment: pre-test – learning – post-test – transfer, and has three objectives:

1. The evaluation of the cognitive efficiency reflected in the actual performance,
2. The ability of the children to elaborate resolute strategies in problem-situations
3. The evidence of the deficient cognitive functions.

The Cognitive Modifiability Battery has two forms: a form for the evaluation of the extent of the modifiability and of activation of learning potential. The second form is a clinical version, used in clinical trials of the analytic components of the deficient cognitive functions.

Though respecting most basic construction, application and interpretation rules of the Feuerstein theories, the author introduces after the post-test phase a fourth phase, the transfer phase, where the learning potential and the level of cognitive modifiability are highlighted throughout the child's ability to use the resolute strategies formed in the learning-intervention phase. Comparing to other dynamic assessment instruments, the author introduces in the theoretical basis of the battery, along with the classical concepts of the theory of modifiability, elements from the contemporary cognitive theories regarding the process of information and the structure of the intelligence. The author considers that an important indicator of the cognitive flexibility is the extent of the modifiability of the operations involved in the mental imaging, generally speaking, and specifically in the mental rotation of images (Tzuriel, 1995a).

The battery is developed on the structure of five cognitive factors: the ordination of information, reproduction of patterns, analogical thinking, sequencing and working memory). The level of modifiability of these factors, according to Tzuriel (1995a), under the influence of

mediated interventions, is considered to be determinant for the cognitive reconstruction and reflects the level of cognitive modifiability and the zone of proximal development.

Procedure

The psychometric tests and the subscales of the Cognitive Modifiability Battery were individually applied. Worth to mention that the application of the subscales lasts for three hours.in order to avoid fatigue and overloading of the participants the subscales were administered during several sessions. During the data collection – due to objective causes like illness, overloading school schedule, moving to other locations – several subjects were excepted from the administration of some subscales. Four subscales were administered: Seriation, Reproduction of Patterns, Analogies and Sequencing.

The administration of these subscales included in the trial is based on the conclusions of studies conducted by Tzuriel & Samuels, 2000; Poehner, 2008. The studies were based on the theories of cognitive modifiability depending on the cognitive factors involved in the determination of performance on the basic disciplines (math's, mother language) at primary school children. We skipped the Memory-rotation subscale, because the level of modifiability of the memory was assessed with the Plateaux test, used in study 3.

The items of the scales were administered by using external mediation established during the wrong answers (errors). For all the items of all the applied four scales nine types of mediation were administered:

1. Accommodation with the cognitive task: these mediations targeted the formulation of the problem to be solved, the naming of the presented stimuli, the localization of the structural elements of the stimuli (form, color, size)
2. Spontaneous correction: these types of mediation were given under the form of intervention which targeted the metacognitive components of the resolution of the cognitive task

3. Fixing: help that targeted the determination of the relevant information for the completion of the task
4. Attention: orienting the child's attention toward efficient resolute procedures and strategies
5. Two criteria: mediations which targeted the use of two criteria in order to solve the task (properties of the stimulus: ex. Form, color)
6. Three criteria: mediations that targeted the use of three criteria in order to solve the problem (properties of the stimuli: form, color, size)
7. Multiple criteria: mediations used in situations when the elaboration of the correct strategy was completed by the criterion of position, the element of rotation and transformation of stimuli
8. Fix errors: type of mediation which targeted the elimination of stereotype errors
9. Variable errors: represent the mediations used at the complex stimulus, with multiple criteria, from whose combination the subject skipped to include one criterion.

During the administration of the cognitive tasks the type and number of mediation were registered for every subscale.

Results

The Cronbach α values obtained on the scales included in Table 2 are higher than the ones reported by Tzuriel (2000) in the validation study of the Cognitive Modifiability Battery (CMB). The relatively low result obtained at the Reproduction of pattern subscale ad at the visual perception test of M. Frostig (1966) can be explained by the fact that they are referring mostly at the same cognitive processes (visual transport of the information, the identification of the defining properties of the stimuli, the identification and definition of the spatial properties

of the stimuli), which at the age of the examined first and second graders children, have an asymmetric factorial development. Thus the cognitive task included in the Reproduction of pattern subscale are relatively simple (to identify the properties of the stimuli: form, color, high, position), when solving the more complex items of the subscale the children need to establish the spatial position of the element, this perceptive ability is in the zone of proximal development, it's developing and it's not deficient (Tzuriel, 1995a).

Table 1

The Cronbach α value obtained on the subscales of the CMB, Raven intelligence test and the visual perception test of Frostig

Applied dynamic instruments and psychometric tests	**Number of items**	**Cronbach α**
Seriation	13	0,62
Reproduction of Patterns	9	0,59
Analogies	14	0,68
Sequencing	10	0,75
IQ	5 (Raven A, B, C, D, E)	0,80
PQ	5 (Frostig I, II, III, IV, V)	0,65

The descriptive values obtained by the participants at the psychometric tests and dynamic assessment instruments reveals a structure that shows a discrepancy between the results of the psychometric tests and of the cognitive modifiability instruments: at an average of IQ of 93,09 on the psychometric Raven Intelligence test is corresponding relatively high results in some dynamic instruments: on the Reproduction of Patterns of the CMB subscale the average of the result is 169,91 points out of the maximum 185. The averages reported to the maximum points are high on the other subscales too. These results are determined by the discrepancy of the cognitive performances these children can reach in the context of an

assessment based on the acquired knowledge comparing to the structured evaluation context of the mediated learning experience and of the principles of structural cognitive modifiability of the dynamic assessment instruments.

Table 2

The correlation coefficients between the Cognitive Modifiability Battery subscales and the result of the psychometric

CMB Subscales	**N**		**IQ**	**PQ**
Seriation	89/90 /89	r	**+0,310**	+0,193
		p	*0,003*	*0,070*
Reproduction of Patterns	89/90 /89	r	+0,187	+0,165
		p	*0,077*	*0,123*
Analogies	89/90 /89	r	+0,185	**+0,267**
		p	*0,082*	*0,011*
Sequences	89/90 /89	r	+0,074	+0,124
		p	*0,491*	*0,246*

In order to determine the level of cognitive modifiability and the index of the cognitive profit in the mediated learning context an important element of the interpretation is to analyze the number and the type of mediation offered during the task solving of the CMB. Based on the total number of mediations used on the entire sample is obvious that the most difficult tasks at the entire CMB were to elaborate resolutive strategies in order to be able to consider multiple criteria. Is worth to mention the relative high number of meta-cognitive type of mediation at the Analogies subscale. The differential number of mediation used in the four subscales of the CMB indicated the cognitive modifiability is differentiated on types of cognitive processing involved in solving different tasks.

Table 3

The number and types of mediation offered at each CMB subscale

Types of mediation	CMB subscales and the number of mediations			
	Seriation (N=90)	**Reproduction of pattern (N=90)**	**Analogies (N=90)**	**Sequencing (N=90)**
Accommodation	**21**	3	8	13
Spontaneous correction	31	28	41	**47**
Fixing	5	6	**9**	8
Attention m metacognitive mediation	35	29	**48**	**47**
Two criteria	**11**	2	3	—
Three criteria	**32**	17	28	18
Multiple criteria	**45**	**36**	**61**	**69**
Fix errors (color, size)	16	14	**20**	17
Shifting errors	8	7	**14**	**14**

Analyzing the grouped values in seen clusters demonstrates that some clusters, although containing student with almost identic psychometric coefficients (clusters 1 and 7) are differentiated based on the number of used mediations, so they have a sensitively different cognitive modifiability.

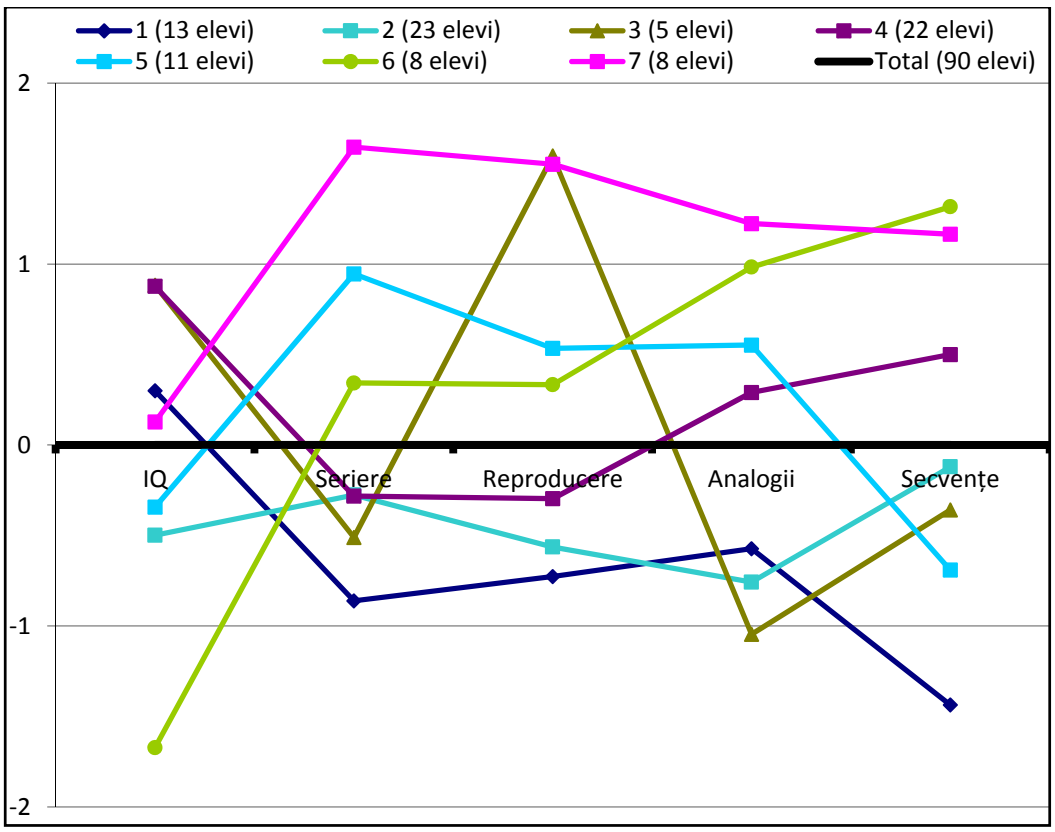

Figura1. The profile of the types of students based on their IQ and the number of mediations

Type 1 (cluster 1) is formed by 13 students, 8 boys and 5 girls, with IQ over the average and needed the less mediation in seriation, reproduction of patterns and sequencing, and some mediation, but under the average of the 90 children, in the analogies subscale. The average age in 10,2, the school results of these children is average. From the 13 children 7 are in the fourth grade, 4 in the third grade and 2 in the second grade.

Contrary the type 7 (cluster 7) has a category of students with average intellectual functioning

(IQ=94), but needed significantly more mediation at the CMB subscales and demonstrates a minimum cognitive profit. At the almost same level of cognitive functioning (psychometric IQ), the degree sensitively different of cognitive modifiability and cognitive profit of the students in clusters 1 and 7 covers a different learning potential. The student from

cluster 1 are showing a significant cognitive progress if they are exposed systematically to the structured stimuli of the mediated intervention. The distribution on classes of the seven types of children shows that the students with modifiability and cognitive profit are in the upper grades. One of the explanations is sustained by the number and type of help at the subscale of Analogies of the CMB, which can be the result of the ages of schooling: after four years of organized learning the children formed their resolutive strategies in the school type tasks.

Combining the result on the psychometric tests and dynamic assessment scales, and the belonging of the students to the clusters 1-7 on the 7 cluster analysis, and A.B and C on the three cluster analysis, and identifying the children on tables, we can design a cognitive profile characteristic to the modal children with different ability of cognitive profit and cognitive modifiability.

The diagrams are presenting, in three colors, the different level of cognitive functioning, measured with psychometric tests and the level of cognitive modifiability.

The cognitive profit of the type A modal student presents an average IQ, low to average school performances, which indicated a deficient cognitive functioning. Due to a reduced number of interventions the student realizes a high cognitive profit, a superior cognitive modifiability, which is highlighted in all four subscales (seriation, reproduction of patterns, analogies and sequencing). These children reach the zone of efficient functioning.

Subject No28 on the dendrogram has the configuration presented in Figure 2. The subject is a girl, second grade, age 8, IQ under average (IQ=93), low school performance (2,0), which indicates a deficient cognitive functioning. Due to the mediation reaches a cognitive profit of PC+47, representing an average level of cognitive functioning and a moderate cognitive profit.

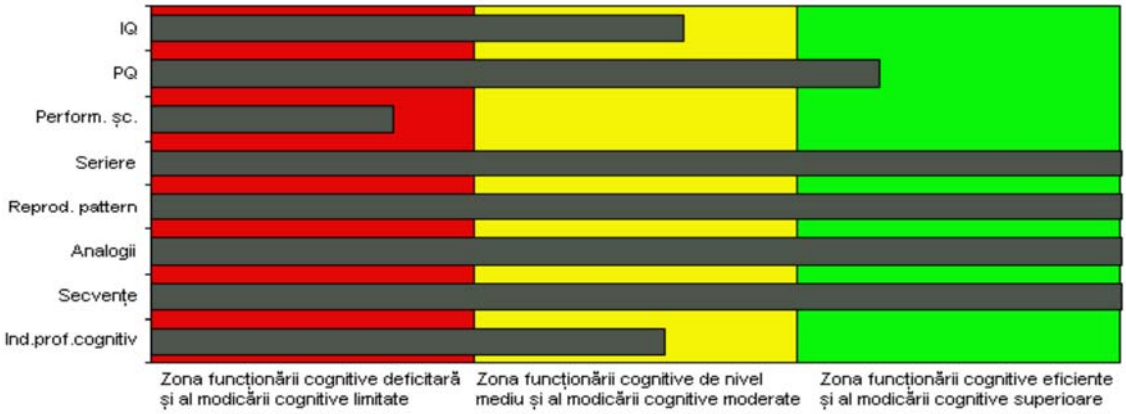

Figure 2. Profile Type 1/A. (#28, Girl, II.-nd grade, 8 years)

Conclusions

1. The results are confirming the hypothesis regarding the different level of cognitive modifiability at the same level of psychometric coefficients.
2. The results are confirming the assumption that the psychometric tests are evidentiating the cognitive performance, the dynamic assessment instruments address the different levels of competence in solving cognitive tasks.
3. The index of the cognitive profit and the two model elaborated in the study: the index of the cognitive profit and the index of cognitive modifiability, because reflects the characteristics of the cognitive functioning in the context of mediated learning, and they are efficient indicators in completing the information offered by the psychometric indicators.
4. The analysis of the profile of cognitive modifiability offers information for the intervention for cognitive restructuring and modeling, which will affect the correction of the deficient cognitive functions and in order to obtain required school performances.

CHAPTER III.
STUDY 2. THE ASSESSMENT OF THE INTERACTION OF THE DISTAL AND PROXIMAL FACTORS IN DETERMINING THE LEARNING ABILITY

Distal and proximal factors of the cognitive development

Walberg in the theory of the educational productivity (Wang, Haertel & Walberg, 1993) describes a model of the proximal and distal factors which influences the cognitive development of the child. Proximal factors: (a) the child's abilities (previous performances, level of development, motivation), (b) educational and instruction (quality and quantity of instruction), and (c) environmental factors (family, school, house, media). The socio-economic status, the income, the size of the classroom are considered distal factors.

Feuerstein defines the learning difficulties as a status, not a human characteristic, due to the fact that the man is not an object with static characteristics, the human status is modifiable (Feuerstein, Feuerstein & Falik, 2010). This theory counters Jensen, who stated that the human functioning is genetically and hereditary coded.

Feuerstein (Feuerstein, Rand, Hoffman & Miller, 1980, Feuerstein et al., 1981, Kaniel & Feuerstein, 1989, Feuerstein, 2006) considers lack of mediated learning experience is the main proximal factor, thus family, culture and schooling can be considered proximal factors, which mediates learning and ensures the development of the deficient cognitive functioning.

The biological, genetic, organic factors, the socio-economic status, income, traumas, level of maturity, emotional state, level of education are considered as distal factors, which are obstacles for the mediated learning. Feuerstein (1979, Feuerstein & Jensen, 1980) considers that mediated learning has an essential contribution to the cognitive development, distal factors as enlisted above can cause the abnormal development of the child/ children who have communication problems (Barnhill, 2001) (ex. Children diagnosed in the autistic spectrum) are

characterized by difficulties in relation with the environment (Donaldson & Olswang, 2007). This difficulty prevents them to benefit from the mediated learning experience, which leads to cognitive deficiencies and a low modifiability (Feuerstein, 1979). Children having different cultural background can face with difficulties emerging from the different culture, traditions, habits, which can lead to cultural and social deprivation (Feuerstein et al., 1982, Feuerstein, 2006, Kozulin et al. ., 1997).

Method and procedure

Participants

The children from this study were selected by the teacher, who identified some problems and learning difficulties, and considered that they would benefit from a thorough psychological examination.

60% of the children from the sample are male (55 subjects), 40% are female (36 subjects). 77% of the subjects are from a school in Cluj-Napoca, with Hungarian as teaching language, 23% are from a boarding school in Jebuc (Salaj county), with Hungarian as teaching language. 23 children of the sample (25 % of the subjects) are first graders, 21 (23% of the subjects) are in the second grade, 24 children (25% of the subjects) are in the thirds grade and 23 students (25% of the subjects) are in the fourth grade. Age M=9,44 (SD= 1,25 years).

Instruments and procedure

The ASEBA evaluation system (Achenbach & Rescorla, 2011) consists of chestionaires for the assessment of the emotional and behavior problems of children and young people. For the age between 6 and 18, ASEBA offers the possibility to assess the children by parents based on the CBCL *(Child Behavior Ckecklist),* and by the teacher TRF (*Teacher Report Form*) and self-evaluation report YSR (*Youth Self Report*) for the children aged between 11 and 18.

The TRF form of the ASEBA can be completed by the teachers, educators of other person familiarized with the child's behavior in school, like counsellors, administrators or other support teachers. TRF offers the rapid and efficient possibility to obtain an image of the child's functioning in school environment, perceived by the professors, educators, and other persons from this environment. The questionnaire can be used to compare information gathered from other persons, who see the child in school, and to compare the evaluations obtained with the CBCL or YSR. The first page of the CBCL offers demographic information on the student.

TRF has two parts: the first assesses the academic performance of the child in school, the relation with the colleagues and performance in different tests or skill evaluations. In order to acknowledge the teacher's experience in the context in which the child is seen, the respondents are asked to indicate their role in the school, how long do they know the child, how much time the child spends at their class, what kind of discipline they teach to the child. They are requested to mention if the child was ever proposed for placement in a special class, if the child repeated any grade. The descriptive information can enhance the understanding of the quantitative data and the scores of the scales. In order to have an image on the children's behavior in school, the respondent are asked to evaluate the children's school performance and aspects pending on the child's implication in work, relationship with other children, how much he learners, how happy he is.

The second section ask the teacher to offer the results in aptitude or knowledge tests, followed by any information regarding the child's illnesses, disabilities, worrying aspects, strong points and any other comment if necessary.

The second part of the TRF asks for information on behavior, emotional and social problems, scored with 0 or 1. The teachers are asked to base their evaluations on the last 2 month. This period is considered because they teachers have to evaluate the children after a

delimited period (2 months), and the re-evaluation takes place at shorter periods than 2 months, during a school year.

The CBCL-TRF takes a long time and not all the teachers were willing to complete them and to facilitate due research. Due to this circumstances we couldn't collect all the data on the 91 students. At the detailed analysis we will present the effective number of subjects, at the analyses of the hypothesis we will present the degree of freedom also.

The teachers evaluated the performances in three disciplines at 80 children. We are not speaking about the grades at the specific disciplines, but a holistic overall evaluation, on 5 step ordinal scales.

Results

The CBCL report were collected on 79 subjects. The teachers decided if the 112 characteristics and adjectives of the CBCL, Teacher Report Form 6 – 18 are: very true, true/often true, sometimes/in some degree true, or false regarding the examined child. For exemplification the answers were projected on a 100 scale: false = 0 points, sometimes true = 50 points, very true = 100 points).

Based on the standard evaluation of the questionnaires we could calculate 8 scale values. The first scale measures the affective problems, mostly the gravity of predisposition to depression. The items of our sample don't form a reliable scale: Cronbach α=0, 67, and this doesn't improve not even we eliminate the mot inappropriate items.

Table 4

The evaluation of the teachers of the level of the affective status (CBCL)

Simptom of depresia	**Sometimes true**	**Often true**	**R^2**	**Cronbach α**
His is unhappy, sad or depresive	27	8	0,60	0,58
Is apathic or unmotivated	29	13	0,44	0,59
Enjoys few things	27	13	0,38	0,65
Feels too guilty	14	2	0,32	0,65
Is slow, moves slowly, lacking energy	29	19	0,29	0,64
Feels inferior of worthless	21	8	0,28	0,64
Hurts himself,predispsosed to accidents, attempts to suicide	0	2	0,19	0,67
Speaks about suicid	1	0	0,19	0,68
Cries a lot	13	6	0,11	0,70

The second scale measure the anxiety, but neither this scale is reliable. Based on our sample Cronbach α=0, 49, and this doesn't improve not even we eliminate the mot unappropriated items.

Table 5

Correlation between the levels of success in school disciplines the ADHD scale and the deviant behavior scale of CBCL

Pearson Corelations		ADHD scale	Deviant Behavior Scale
Romian	r=	-0,179	-0,196
	p=	0,117	,086
Hungarian	r=	-0,382	-0,268
	p=	0,001	,018
Matemathematics	r=	-0,318	-0,248
	p=	0,005	0,029
	N=	78	78

Due to the fact that the results of the sample in only partially reliable in the scales published in the literature, the assessment models of the teachers worth to be analysed with the factioral analyse. In this analysys we delimitated the items indicated by the teachers at less then 10 students, and the items which even after this would have a communinality lower than 0.050. the factorial analysys was made by the analyse of the principal componentns and oblic direct rotation, we permitted the the values to correlate betwenn each other. The 79 factors which can be considered are grouped in 9 factors, which covers 67% of the total variance. Based on factor 9 it doesn't worth to build a scale. In this scale just the item "cries a lot" has value. The indication of the item was present in 15 students (13% rare + 6% often =19%).

The factor correlates with the deviant behavior scaler=0,82 (p=0,000000) and with the ADHD r=0,76 (0,000000). Based on these we can state that the scale calibrated between 0 and 100 measures the gravity of the deviant behavior in children. Average of the scale is M=36,36 , SD=23,71. The value of this indicator is above 50 points in 21% of the children, which

indicates a severe deviant behavior. The teachers outlined 15 boys (30% of the subjects) as having severe behavior problems, and only 2 girls (7%)

The second scale measures the level of learning difficulty, mainly the learning difficulties generated by the attention deficits. M=41,37, SD+ 26,56. The value of the factor is over 50 points at one third of the children. The average in boys is higher (46,07 points), than the girls (33,26 points, t=2,11, p=0,038). The scale r=0,59 (p=0,000000) correlates with the ADHD scale, and r=0,35 (p=0,001473) with the scale of behavior disorders.

The third scale of factors measure the extent to which the teachers perceive the children as excessively controlled M=38,01, SD=19,84. The value of the scale is over 50 points in 25% of the cases. The average of the girls and boys is very different, the indicator doesn't correlate with other scales.

The high values of the scale with 5 factors show the tendency to aggressivity of the children M=34,11, SD=22,52. The average of the boys – not surprisingly – is higher (38,11%) than the girls (27,21 points) (t=2,54, df=73, p=0,013109). In the case of one fifths of the ch8ildren the indicator is over 50 points. The aggresivity scale correlates r=0,54 (p=0,000000) with the scale of deviant behaviors, and weakly, but significantly correlates with the ADHD scale (r=0,28, p=0,0129). There is a week, but significant correlation with the scale of behavior disorders : r=0,23, p=0,041951.

Table 6

Factor 5. Level of agressivity

Agresivity	**Average**	**Comunality**
Distroys his own belongings	0,81	0,72
Is sloppy	0,70	0,65
Lies or steels	0,68	0,65
Has an explosive or umpredictable behavior	0,60	0,75
Distroys others beklongings	0,57	0,66
Spending his time with persons who get into trouble	0,53	0,78
Swears or uses obscene words	0,52	0,71
Has speech dificulties	0,48	0,65
He is defiant, disrespect	0,46	0,75
Disturbs the others	0,43	0,70
Acts irresponsible	0,42	0,73
Works disorderly	0,42	0,64
He is furious, loosing temper	0,42	0,66
Hes demands have to be fulfilled, becomes easily frustrated	0,41	0,59
Shifts from one emotional stage to the other	0,40	0,55
Has nervous, sudden mooves or contractures	0,40	0,65

The 6-th scale measures to what extent the teacher perceives the child as being nervous, irritable: M=37,64 points, SD= 19,27. The value of the indicator is over 50 in 19% of the students. The nervosity scale r=0,42 (p=0,00011) correlates with the behavior disorders scale and with the ADHD scale r=0,38 (p=0,000567) cu scale ADHD. Between the scale of behavior disorders and nervosity there is a week, but significant correlation: r=0,23, p=0,041437. The average between the boys and girls doesn't differentiate considerably.

Table7

Factorul 6. Nervousity

Nervosity	**Average**	**Comunality**
Hearstrong, grumpy, irritable	0,80	0,72
Pouts	0,75	0,73
Nervous, tensioned, irritated	0,74	0,75
Doesn't get along with other children	0,71	0,65
Suspicious	0,68	0,64
Acting irresponsable	0,67	0,73
Cries or believs that nobody loves him	0,64	0,61
Has the impression thet other have something with her	0,63	0,57
Other kids doesn't like him	0,57	0,60
Has nervous, sudden moves or contractures	0,57	0,65
Feels hurt when criticized	0,54	0,55
Feels tired with no reason	0,53	0,68
His demands has to be fulfilled, if not becomes easealy frustrated	0,52	0,59
Shifts suddenly from one emotional stage to other	0,51	0,55
Has many secrets, keeps thing for himself	0,49	0,74
Is impulsive, acts without thinking	0,46	0,74
Taunting others	0,43	0,70
Screems a lot	0,43	0,78
Refuzes to tlak	0,42	0,67
Has furies, losses temper	0,41	0,66

The 7-th scale measures the degree of introversion of the children. According to this, the items "braving", "acting fool" and "impulsive" have negative connotation: M= 30,30, SD=18,16. The value of the scale is over 50 points in 15 of the cases. The indicator presents a week negative correlation with the ADHD scale: r=0,30, p=0,00671. The teachers are

delimitating very visible in our sample the quiet, withdrawn children from the others. This is evidentiated in our sample in a negative correlation with the scale of behavior disorder: r=0,25, p=0,024601.

Conclusions

The result shows that in the case of Romanian language the language proficiency acquired in the family has notable effect. This result underlines the fact that the cultural differences can influence school performance, considering that the subjects of the study are native Hungarian.

The results also shows that the students with high performance in Romanian language learning are less introvert that the children who have lower proficiency in Romanian. The subjects of the study are native Hungarian children. The results showed that the introverted children have lower performance in learning languages, that the extroverted ones.

The socio-economic status of the parents influence the teacher's attitude. It has been shown that the teachers have a better opinion on the children coming from higher social-economic status, contrary to the children coming from families with low socio-economic status.

The result proofs that the level of education of the parents differs function to the schooling institution of the children and influence the level of content of the children.

CHAPTER IV.
STUDY 3. EVIDENTIATION AND ACTIVATION OF THE COGNITIVE POTENTIAL IN THE ZONE OF PROXIMAL DEVELOPMENT

Learning difficulty from the dynamic assessment perspective

The concept of learning difficulty was introduced in the school and educational psychology in the ’60s (Budoff, 1968), in order to create a theoretical system with practical applications regarding the differential diagnosis of the children facing school failure. The diagnosis doesn’t include the determination of the level of retardation of the cognitive, sensorial of physical level (Missiuna & Samuels, 1989, Carlson & Wiedl, 1992). According to this concept, at this group of students the school failure is mostly determined by three categories of causes: LSES – low socio-economic status, (Borland & Wright, 1994, 2000, Seifer, 2000), emotional disorders (Barnhill, 2001) and cultural-linguistical deprivation opposite to the children coming from the majority cultural and linguistic context (Pena, 2000, Law & Camilleri, 2007).

According to the theory of cognitive modifiability of Feuerstein (1979), this population faces school failure due to their incapacity to profit from the randomized influences of the school environment, which is shaped for the population belonging to the dominant culture (Feuerstein & Kozulin, 1995). The students from this groups, systematically exposed to the structured stimuli function to their ability to adapt, demonstrates an ability to considerably progress (Garber & Heber, 1982).

This progress reflects the level of cognitive modifiability and determined the remediation of the learning disabilities (Campione et al. 1985).

Comparative analysis of the psychometrical tests and dynamic assessment instruments

Haywood (Haywood & Tzuriel, 1992) considered the criticism of the specialists in psychometrical assessment related to the ethnical groups and different age groups. In the case of these groups the psychometrical tests doesn't show the expected validity. Due to the (Budoff, 1987; Büchel & Scharnhorst, 1993; Caffrey et al., 2008) studied the problem of the predictive validity of the dynamic assessment, Kozulin and other disciples of Feuerstein (Kozulin & Falik, 1995, Lebeer, 2005, Kozulin & Gindis, 2007) synthetized the paradigm shift installed in the theorization of the dynamic assessment and the debate regarding its efficiency in the cognitive development (Schneider & Flanagan, 2015).

Objectives and hypothesis

The main objective of the study is to point out with dynamic assessment diagnosis the differences between the cognitive functioning of the students with learning difficulties in the conditions of performance centered evaluation (the actual zone of the cognitive deficiency) realized with psychometric tests and the evaluation based on the ability to acquire cognitive competences belonging to the zone of proximal development, assessed with dynamic assessment instruments.

The dynamic assessment is the expansion over the whole process of evaluation of the learning potential of the zone of proximal development, the name of a phase of a procedure of learning/forming of the competences throughout mediation by and adult in order to hel0p the children to form their own cognitive instruments necessary to solve the presented situation.

The second objective of the study is the application of the dynamic/formative paradigm on a psychometric test. According to this paradigm, any psychometric test can be transformed into a dynamic assessment procedure. Throughout this transformation it can be highlighted the activation possibilities under the effect of the mediation of the assessed cognitive structures.

The main hypothesis of this study is to demonstrate the categorization differences of the students with learning difficulties pending on the nature of the applied test: psychometric tests or dynamic assessment instruments. In this hypothesis we wish to evidentiate the complementary nature of the two categories of categories of instruments. These instruments are referring to the same cognitive functions belonging to different zones of proximal development.

The student with learning difficulties can manifest higher cognitive performances when assessing with dynamic assessment instruments comparing to the result on the psychometric tests. The dynamic assessment instrument are offering an x-ray of the IQ-s obtained with psychometric tests. The study tries to demonstrate the announcement that at the same IQ level children can have different learning potentials.

Method and participants

The subjects were 31 one primary grade scholars from the Brassai Samuel Highschool in Cluj-Napoca. The participants' age was between 7-10 years: M=8,71, SD=9,973. Subjects were 23 male (74,2%) and 8 female (25,8%). The participants were selected based on the discrepancy criterion between the school results and the level of cognitive functioning measured with psychometric tests. The results of the psychometric tests were taken from the evaluation records of the children from the school psychologists.

Instruments and procedure

Matrix Analogy test (Naglieri, 1985)

The Matrix Analogy Test examines four basic components of the intelligence: completion of patterns, analogies, serial reasoning and spatial reasoning.

Completion of patterns contains items 1-1, 18 tasks. On the pages 1-11 are geometrical figures which will complete a pattern. There is a missing peace, on the place of the missing figure there is a question mark. On the bottom of the page there are numbered squares. The subject has to choose the correct number (the answer), which will complete de pattern.

Analogies contains items 2-1, 16 tasks. On the page appears columns of squares (4,6, or 9), which are containing the same sing. On the left column the place of the last square is marked with a question mark. On the bottom of the page there are six squares identical to the square on the left. The task is to choose the correct number (the answer).

Serial reasoning contains items 3-1, 16 tasks.

The test contains pages with squares with signs, geometrical figures or models, which will compose a logical series. On the place of the last item is a question mark. The task is to point out the correct answer which will complete the logical series.

Spatial reasoning contains items 4-1, 16 tasks. There are one or two columns on the page, with signs and geometrical figures, which are complementary and grouped in space. On the place of the last item there is a question mark. The task is to choose from the six squares on the bottom of the page the right answer which will complete the image.

Basically the M.A.T. test is a psychometric test, which was applied according to the dynamic formative paradigm, the items from the subscales were sorted in two parallel series. One series (Series A) was constructed from the even items and this is the pretest. In series B are sorted the odd items and was used as posttest.

External help was provided on the A series. The number of correctly solved items is the actual level, manifest in the cognitive functioning of the participant. After mediating the unsolved items of A series, the B series was applied, without any help or mediation. The difference between the solved items in the posttest and the ones without help in the pretest constitutes the zone of proximal development.

Plateaux Test (Feuerstein et al., 1979, 2008)

The Plateaux test is a dynamic assessment device to evaluate the extent of internalization of the external actions, and following a pattern, to be able to make mental rotations, identification and seriation.

The instrument consists of 4 wood plates, square shape ”plateaux”, about 20 cm width. Each plate has 9 circular pegs, about 2,5 cm Ø. On each plateau 1 of the pegs is fixed, the other are loose; the pegs must look all alike, so there can be no visual identification of the fixed peg.

In the first phase the subject is asked to identify the fixed peg on each plate. After identifying the fixed peg, the plates are put on inverse position. In this phase the subject is presented a bi-dimensional schema, representing the four plates. In the third phase the plates are rotated with 90 degrees. After the rotation the subject is asked to identify the fixed pegs.

The instruments proofs the efficiency in examining mental representation ability of the subject on external objects and actions , and his ability due mental operations such as seriation, rotation, comparison on the formed representations.

The results are relevant to evidentiate the subject’s ability to elaborate resolutive strategies and the volume of work memory. The instrument is administrated individually, because the mediation, which is depends on the individuals own errors. The extent of modifiability is given by the number of correct answers when identifying the fixed pegs after the rotation phase. All the instruments were individually administered.

Results

The results are showing homogeneity in the MAT pretest and posttest scores. Worth to mention is the fact that the overall values of the posttest on each dynamic instrument are higher than in the pretest. This values sustain the validity of the hypothesis of the effect of the learning phase.

Table 8

Descriptive statistics of the pretests and posttests

Dynamic instruments	**N**	**Min**	**Max**	**M**	**SD**
Completion of patterns pretest	31	0	14	10,58	3,622
Completion of patterns posttest	31	7	16	12,52	2,719
Analogies pretest	31	1	12	6,61	3,180
Analogies posttest	31	1	15	9,06	3,463
Serial reasoning pretest	31	0	14	8,42	3,905
Serial reasoning posttest	31	2	16	10,61	3,809
Spatial reasoning pretest	31	0	9	2,77	2,753
Spatial reasoning posttest	31	0	13	3,55	3,031

The average between pretest-posttest are strongly significant. This demonstrates the effect of the maturation of the cognitive functions in the actual zone of proximal development, under the action of exposing the children with learning difficulties to the effect of the structured stimuli in mediational context.

The comparative examination of the values of the three variables (school results, IQ and educability coefficients) are sustaining one of the main hypotheses of the study: at the same psychometric IQ level there are different educability coefficients. For example subject 1 and 7.

At different psychometric coefficients there are relatively the same school results and same educability coefficients. The major difference between the two subjects is the cognitive plasticity: subject no.1 answers more efficient to the proximal factors of development than subject no.7. We also can mention subject no. 21,l who has low school performance and an IQ below average, but has remarcable educability coefficient.

Because the educability coefficient are strongly correlating, we extracted one factor from the four educability coefficients, which we call educability factor. The unifactorial model has 61,8% power of explanation of the variances of the four educability coefficients. On the items the variance is explained between 51,3% and 70,6%. The obtained factor strongly correlates with the educability coefficients, the correlation coefficient is between +0,717 and +0,840.

Table 9

Correlations between the educability coefficients

Educability coefficient	**R**	**Pattern completion**		
Analogies	R	**+0,413**		
	P	*0,021*	**Analogies**	
Serial reasoning	R	**+0,523**	**+0,687**	**Serial reasoning**
	P	*0,003*	*<0,001*	
Spatial reasoning	R	**+0,541**	**+0,379**	**+0,390**
	P	*0,002*	*0,035*	*0,030*

The learning potential of the zone of proximal development in the Plateaux test's case can be quantified by calculating the difference of the number of errors from the first and third trial. The average of this difference is M=6,39, SD=8,909. Considering the fact that the

educability factor is not correlated with the learning ability of the child r=+0,098, we can make a cluster analysys to typologies the subjects after these two indicators.

Table 10

Result of the ANOVA test for the validation of the cluster analysis

Cluster	**N**	**Educability factor**		**Learning potential**	
		M	**SD**	**M**	**SD**
1.	5	45,80	17,541	11,80	11,256
2.	13	63,08	13,444	70,00	20,017
3.	12	29,75	15,510	80,17	13,503
Total	30	46,87	21,159	64,37	29,093
Significance		$F_{(2,27)}$=15,49		$F_{(2,27)}$=31,76	
		$<10^{-4}$		$<10^{-7}$	

According to the two variables (the factor of educability and learning potential) the participants included in the study are grouped into three clusters (Table 54). The clusters are evidentiating three types of children with learning disabilities with very different cognitive patterns (Fig. 13). A small number of subjects (5) are characterized by a low learning potential, but the educability factor is average. At these student there is a great discrepancy between the quantity of mediation and the progress in cognitive activation. In cluster 2 are the students whit the variables at the same level. This students manifest a remarkable cognitive plasticity under the influence of mediated learning. In cluster 3 are the students with a remarkable learning potential but the educability factor is very low. These students are coming from a low social economic status family, they have cognitive potential, but it cannot be activated because of the environmental influences.

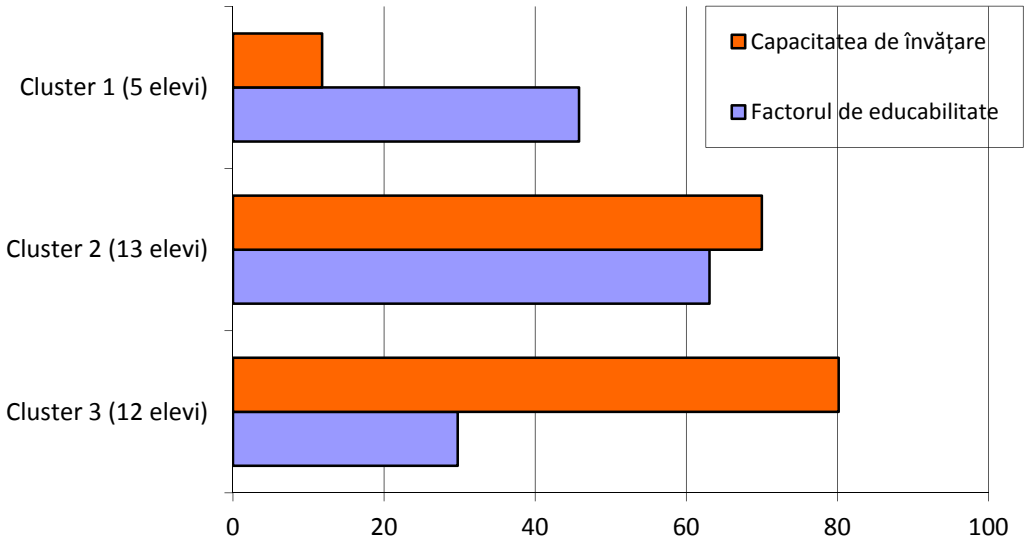

Figure 3. Average values on clusters of the model's variables

Conclusions

As a result of the dynamic assessment it can be calculated an educability coefficient of the students.

The results are confirming the hypothesis, that the subjects can different coefficient of educability at the same level of intelligence, assessed with psychometric tests.

The coefficient of educability, which contains external influences (motivation from family context, positive emotional status), supports Feuerstein's statement (2006) regarding the importance of proximal factors in the cognitive development of children

The obtained values are supporting the value of the dynamic assessment instruments in the dynamic assessment approach.

CHAPTER V
GENERAL CONCLUSIONS

Throughout the studies of the thesis we highlight the efficiency of the Mediated Learning Experience in the determination of the cognitive efficiency. We delimited the main methods of administration of the dynamic assessment paradigm and the methods of administration of the obtained data. The parallel comparison between the psychometric tests and the dynamic assessment instruments highlights the theoretical and practical values and limits of both categories of psychological instruments.

The main objective of this thesis is to demonstrate the thesis according to which these two assessment methods of measurement and evaluation of the functional level of the cognitive system are complementary and not opposite. The combination of the psychometric testing and the dynamic assessment methods offers an exhaustive image on the structure and functional level of the cognitive system of the examined subject. The complementary elements which this method offers is referring to the cartography of the cognitive processing, according to the basic paradigm of the cognitive approach: on input, elaboration and output level; and the highlighting within of the developing processes and the mature ones. The information allow to delimit these processes and further to intervene upon these processes with dynamic intervention.

The psychometric tests are targeting the cognitive functioning from the perspective of performance, the dynamic assessment device have a selective and classificatory function. These are addressing more – according to Feuerstein's theory – the mechanisms of acquiring different levels of the competent behavior. These mechanisms are highlighted throughout the formative phase of the assessment.

The data of the study sustain the hypothesis of the cognitive modifiability under the influence of exposure of the children to structured stimuli, which targets the formation of a cognitive competence. These instruments act throughout the offered mediations both on the

cognitive processing and on the motivational-emotional components of the activity. Thus along the increasing cognitive efficiency appears the feeling of competence which is a very intense motivational factor.

One can obtain efficient cognitive functions throughout the mediated interventions that targets a cognitive restructuring and remodeling. In this respect the dynamic assessment interventions can be considered as clinical instruments with double function: diagnosis and intervention. The intervention component targets the plasticity of the cognitive system.

The data from the first and third study sustains the hypothesis that exists a differentiated modifiability, which is not determined directly by the IQ measured with psychometric tests. The data demonstrates that several subjects with learning difficulties, where according to the criterion of discrepancy between the level of cognitive functioning and the school performance, there is an ability of cognitive modifiability and a considerable learning potential. Data from the study are sustaining the fact that distal and proximal factors are influencing the cognitive development and are determining the level of cognitive functioning. These students, having temporary delay in the maturation process of some cognitive functions are categorized by their teachers as having special education needs. The activating intervention determines at these students the maturation of the cognitive functions and the remedial of the learning difficulties.

We elaborated and presented in the thesis patterns of cognitive functioning by using some variables which were identified by using the data obtained during different phases of the evaluation processes. The cognitive profit index, as a measure of the cognitive modifiability, the index of the learning potential, the educability factor are indicators which are referring to the parameters of the cognitive functioning. These indicators successfully complete the selective function of the psychometric tests by demonstrating that at the same level of IQ exists different levels of learning potential and cognitive modifiability.

Reported to the psychometric tests, the dynamic assessment instruments have at least two particular characteristics, which determine their restrictive use of the practitioners:

1. The administration of a complete dynamic assessment instrument lasts in time due to the intervention phase. The administration of a psychometric type of test like a WISC-IV lasts for maximum one hour, the BMC cannot be administered under three hours or several sessions.
2. The mediation techniques are crucial to the intervention, and have a great influence on the success of the cognitive modifiability. Mastering this skill requires a long-lasting experience.

Synthesis of the personal contributions

Theoretical contribution

By using data which can be registered during the dynamic-formative evaluation process made possible to the elaborate three indicators of the cognitive functioning: the index of the cognitive profit, the index of the learning potential and the factors and coefficients of educability.

The cognitive profit index represents the extent of the cognitive modifiability and the extent of the cognitive plasticity. It is an index worth double determination: a biological one, which refers to the plasticity of the central nervous system and the ability of the child to modify his cognitive processing under the effect of external mediation. This index represents the extent of the used mediations and the rhythm of the child to access the zone proximal development.

The index of the learning potential represents the zone of processing, which are in the stage of maturation, and their ability to activate under the influence of external interventions characteristic to mediated learning. The extent of activation of latent processing represent the central element of the index of the learning potential.

The coefficient or factor of educability is a composite index: along with the plasticity, modifiability and learning potential covers external elements like the influence of the social environment (family), which can attenuate or enhance the effect of the mediated learning. This index allows the examination of the effect of the social environment in motivational and emotional respect. A high cognitive profit and learning potential index can be attached to a low factor of educability. This shows the negative effect of the social environment which can attenuate or suspend the cognitive development.

The derivation from the obtained data of clusters will allow to draw individual cognitive profiles for the children with temporary cognitive delay and will allow the design of efficient external interventions.

Methodological contributions

In study 1 and 3 we elaborate the methodological base for the transformation of psychometric test into dynamic assessment instruments. The results were statistically validated and used to elaborate the indicators and of the cognitive profit.

Practical contributions

One of the practical contributions is the interpretation method and the use in the concrete intervention of the data provided by administrating dynamic assessment instruments and the corroboration with psychometric data, in the sense of their complementarity.

Limits and further research

A limit results from study 1 and 3, from the characteristics of the dynamic assessment instruments: increased time for administration, which can generate fatigue, decrease the motivation and energetic level, and the motivational methods. Studies conducted by Tzuriel & Samuels, 2000, Shamir & Tzuriel, 2004, Wertsch, 2007 demonstrates that different mediation

leads to different levels of modifiability. The administration of dynamic assessment instruments – unlike psychometric ones, where the conditions of administration, the scoring, the registration and interpretation of data are strictly defined – are based on the general principles of mediated learning experience and the registration of data on the cognitive map relies on the practical experience of the mediator.

In study 2 is required the expansion of study of the proximal and distal factors, such as family, social group, social group of the class to examine their mediation effect or to moderate the cognitive profit.

Main direction in further research is to elaborate a precise methodology for the dynamic assessment, which addresses the modifiability of the cognitive processes implied in the determination of the competences in school disciplines in primary classes.

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