# The Contribution of Dynamic Assessment to Promote Inclusive Education and Cognitive Development of Socio-Economically Deprived Children with Learning Disabilities

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**Abstract**

Dynamic assessment refers to an assessment using an active teaching process of perception, learning, thinking and problem solving. The process is aimed at modifying an individual´s cognitive and affective functioning and observing potential changes in learning patterns within the testing situation. This article elaborates on the promotion of cognitive and affective development in school children whose learning processes were evaluated using the Complex Figure of Rey in a Learning Propensity Assessment Device (LPAD) evaluation, as a way to include rather than exclude children from the educational setting. The dynamic evaluation showed the children´s modifiability in functions such as planning, organizing and short-term memory. The LPAD is based on Feuerstein's theories of structural cognitive modifiability and mediated learning experience, with a constructive view on intelligence. Forty-five children, 7 to 15 years old, were evaluated. In dynamic assessment, there is a teaching phase in which the examiner interferes with the process to produce a mediated "peak" performance. The findings indicated that test outcomes were significantly different ($p \leq 0{,}005$) after mediating the learning processes and that this kind of assessment enhances certain executive functions, essential for effective learning. The findings demonstrate the benefit that children can obtain from a purposeful learning experience, which strengthens, through quality interactions, functions that appeared deficient.

**Keywords**

mediated learning experience, learning potential, dynamic assessment

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Executive skills such as organization, impulse inhibition, planning and working memory represent key cognitive functions responsible for a human being's ability to adapt to dynamic environments. Historically, children in Chile from socially deprived contexts have presented deficiencies in the development of certain cognitive abilities, as reflected in the very low scores demonstrated in school achievement assessments conducted by various institutions over time (SIMCE, 2010 in MINEDUC 2012). The assessment of cognitive skills using static psychometric evaluations defines these children as having a learning disability, leaving little room for interventions that could improve their performance and orientation to teaching strategies, thus excluding them from certain educational settings. It should be emphasized that the educational orientation central to the Chilean school curriculum considers the human being to be an open and modifiable system, in which intelligence is not a fixed value but a dynamic auto-regulated process, sensitive to the intervention of an efficient mediator (Mineduc, 2013; Prieto & Pérez, 1990).

In this context, the specific type of evaluation defines the way the child will be taught and the potential challenges the educational system will pose to him or her. Improving the assessment of academic achievement has been a recent topic in the education departments of some of the socioeconomically deprived municipalities. The present study aims to describe the significant changes obtained when assessing children with learning disabilities in a dynamic evaluation setting, leading to a different view on potential learning outcomes. Unlike static tests, the changes reflected in a dynamic assessment remind teachers of the importance of their role in learning, thus leading to more inclusive opportunities for children with learning disabilities.

Structural Cognitive Modifiability and Mediated Learning Experience

The dynamic assessment procedure used in the present study is based on the theory of Structural Cognitive Modifiability (SCM) developed by Feuerstein, Rand, Hoffman and Miller (1980). Feuerstein conceives of the human being as an open system, receptive to change, whose cognitive structure can be enhanced and modified. SCM becomes an essential characteristic of the human being who responds and adapts to new situations and constantly changing new requirements. It is understood that human beings have the capacity to change the structure of their cognitive functions as a means of adapting to the changing demands of life's situations (Feuerstein, Feuerstein and Rand, 2006). Such a structural cognitive change is not transitory, and it differs from the simple accumulation of experience or maturation. This adap-

tational capacity is manifested in different ways in each individual, as not everyone possesses the same capacity for modifiability; thus, change can vary from one individual to another, depending on the quality of the interaction offered.

The modifiability model focuses on those interactions between a person and his or her environment that are mediated by another person. Mediated Learning Experience (MLE) is defined as a human-environment interaction that has particular characteristics determined through the criteria of MLE. The development of cognitive abilities depends on a number of proximal and distal factors, MLE being the most important of the proximal factors (Feuerstein, Feuerstein and Rand, 2006). Not only human beings but also environments themselves can serve as mediators as long as they offer permanent challenging experiences that require adaptations often reaching beyond the current age or developmental status of the person (Feuerstein, Klein & Tannenbaum, 1994; Lidz, 1991).

Adequate MLE can generate openness to cognitive changes of a structural nature and development of an active learning disposition. In contrast, a lack of adequate MLE may result in delays in the person's cognitive development.

### *Learning Propensity Assessment Device (LPAD)*

This evaluation model aims to explore the learning potential of people and identify the types of educational interactions that favor the emergence and development of skills and learning processes that would not otherwise manifest themselves spontaneously in the subject. That is, rather than identifying weaknesses and what the child cannot autonomously do or accomplish, the model aims to identify, recognize and express the hidden potential everyone has. This potential is only expressed when the individual enters into interaction with another who generates the need to use that potential, previously thought to be non-existent, to fulfill intentionally demanding functions.

LPAD is a method that works on the basis of direct observation of learning processes in a subject performing a task or solving a problem. The evaluator is actively involved in this process, interacting with the child through questions, observations and comments that allow the child's internal process of thinking, as well as the emotional and motivational variables accompanying it, to become visible. Thus, the evaluator can recognize those interactions

that best help the child to reach achievements that he or she is not able to accomplish alone. .

The LPAD and the need for a dynamic assessment approach in general arose from experiences with populations whose functioning was low for a variety of reasons and for whom conventional assessment and regular educational programs were totally inadequate. A significant number of studies have incorporated a mediated learning perspective, and it has been applied to a variety of different populations. A unique feature has been dynamic assessment´s generic relationship to concepts of intelligence and cognition, as well as its application to very pragmatic outcome variables for populations with special needs.

The goal of dynamic assessment is to produce changes of a structural nature, defined by their stability, permanence, flexibility and generalizability or transformational nature over time and across varying conditions of exposure or required levels of performance (Feuerstein, 2002). The tasks are selected to reveal cognitive functions and areas of potential dysfunction and to include potential opportunities to use strategies for change. The changes that emerge from the LPAD administration are described from the perspective of deficient cognitive functions, the nature of the tasks performed and the nature and intensity of mediational interventions required. Changes are viewed as propensities for cognitive development, implying capacities for further growth.

The specific LPAD objectives are the following: (1) To identify those cognitive functions that have developed properly; (2) To identify those cognitive functions which are deficient, insufficient, or in a developmental state; (3) To assess the individual's response to teaching strategies and cognitive principles; (4) To evaluate the type and amount of mediation required to overcome cognitive deficits; (5) To develop awareness of the cognitive processes involved in the individual's performance; and (6) To create in the individual, as well as his environment, a positive awareness of his true potential.

### *Evaluation of executive functions: short term memory, planning and organization*

Executive functions have been defined as processes associating ideas, movements and actions, both simple and those geared to the resolution of complex behaviors (Lezak, 2004). Luria (1964) was the first author who, with-

out coining the term, conceptualized the executive functions by observing a series of disruptions in the ability to lead, motivation, formulation of goals and plans of action as well as self-monitoring of behavior associated with frontal lesions. The term 'executive' can be credited to Muriel Lezak (1982), who defined it as the mental capacity essential to carry out an effective, creative and socially accepted behavior. In turn, Sholberg (1989) considers that executive functions include a number of cognitive processes, such as anticipation, goal-setting, planning, behavior selection, self-regulation, self-monitoring and making use of feedback. Executive functions concern the following components: paying attention, prioritizing, formulating an intention, planning, and executing the plan.

Originally, short-term memory, as opposed to the more stable long-term memory, concerned the capability of retaining temporal information. Both concepts (short- and long-term memory) were related to the idea of a data repository where the information is maintained for a short period of time in a special format while transferring to permanent storage. Following the proposal of Craik (1975), short-term memory was considered to be a superordinate concept that includes working memory. Furthermore, Goldberg (2002) considered it more appropriate to emphasize the active role short term memory plays where the rapid selection of data as useful information allows knowledge to be continuously available.

Short-term memory has limited capacity and includes the analysis of information from sensory memory (Gil, 2002). Kolb and Wishaw (2006) note that the concept of working memory could be another way to define short-term memory. However, authors such as Gil (2007) suggest that working memory is not the same but is rather a component of short-term memory. In this perspective, this type of memory would not be a rigid memory that only stores information, as with long-term memory storage, but would play a more active role in information processing. This process would be responsible for the so-called working memory.

Evaluation of executive functions has typically followed a static view. Common tests used to measure executive functions include the Wechsler tests and the Stanford-Binet tests (Weschler, 2004). Specific diagnostic measures include the FAB by Dubois, Slachevsky, Litvan and Pillon (2000) and the Barcelona Test (Peña-Casanova, Gramunt, Gich, 2005).

More recently, other innovative functional and dynamic assessment methods have emerged. The CAS (Naglieri & Das, 1997) is an individually administered measure of ability that holds particular advantages over other measures of executive functions that feature verbal and quantitative content for linguistically diverse students, for example. As Naglieri (2008) states, "reducing the amount of knowledge needed to correctly answer the questions on intelligence tests is a useful way to ensure appropriate and fair assessment of diverse populations" (Lebeer et al, 2011: 120). Measures such as the CAS or the LPAD (Lebeer, 2011) may become tools that provide information suited to children with learning disabilities and thereby promote the child´s learning.

## Materials and method

### *Participants*

A total of 45 children from the Metropolitan Region of Santiago (Chile) participated in the study. All the children came from two communities with common characteristics, including exposure to the same local programs and opportunities and the same low socioeconomic background. The children belonged to one of Santiago's most socially deprived communities. Inclusion criteria included having a clinical diagnosis associated with learning disability. The age of the participants was between 7 and 15 years. Parents and children were informed in advance of the goals and content of the LPAD assessment.

### *Measures*

The dynamic assessment was conducted with one of Feuerstein's LPAD (Learning Propensity Assessment Device) instruments. The LPAD assessments took place within the context of school settings in Chile and were not linked to clinical purposes. All children were living with their families and attended school. Cases were selected from the database on the basis of their learning disability as well as the accuracy and completeness of their records.

A full description of the LPAD test battery is given elsewhere (Feuerstein et al., 1979). The LPAD instruments used are derived from psychometric test

items developed by André Rey (1934), but they have been adapted by Feuerstein in procedure and interpretation. The Complex Figure of Rey is seen mainly as a qualitative instrument in the sense that the changes in the child's learning are evaluated according to the quality of mediation (teaching) as well as through quantitative data. A dynamic test contains a learning phase during which the "tester" intervenes as a mediator to teach concepts and strategies. Afterwards, the child is evaluated again to see whether and to what degree he or she has learned new behaviors. In individual LPAD assessment, mediation is included in each stage of problem solving, not only at the end. In contrast to other dynamic assessment batteries or learning tests, mediation is not standardized in Feuerstein's LPAD; its purpose is to demonstrate a higher level of functioning. This may require a variation in the intensity and proximity of the mediation, according to the needs of the child (Lebeer, 2011).

As Lebeer (2005) states, the goal is to evaluate change in the child's behavior in four domains: cognitive functions, mental operations, affective/motivational factors and learning efficiency (concentration, speed, attention span). Dynamic assessment evaluates the degree and type of mediation needed to bring about change. Changes are essentially qualitative in nature. Scores are only useful in comparison with the child's unmediated performance, not with standards, as will be shown in this paper.

### *Procedure*

This study was conducted during the regular school year (from 2010 through 2012). Children were evaluated in their everyday school context by professionals from the Centro de Desarrollo Cognitivo (Cognitive Development Center), to redirect attention to some of the educational needs presented by children with learning disabilities in their integrated classes. Another goal was to encourage adoption of beliefs as to the possibilities of human cognitive modification, as opposed to the fixed beliefs engendered by static tests that result in the common diagnostic profiles students bring to school. Such indicators of modifiability help teachers revise their expectations and increase their desire for active modifying environments and optimal contexts conducive to inclusive education.

The mediation process depends of the type of response produced in both phases (Copy and Memory) of the Complex Figure model task. Frequently, strategies consist of directing the attention and focus towards the main structuring of the figure, in which the elements are placed inside or outside. The analysis of each element and its relationship to the others is discussed and from that analysis arise different ways of organizing the figure and planning their own behavior. The internalization of this process may be seen in posttest phases, using both copy and representational memory, where students use organizational strategies to build an internal and hierarchical model, previously analyzed according to relevant criteria.

### *Design and statistical analysis*

The study followed a typical experimental design with pre- and posttests in accordance with the described characteristics of dynamic assessment. The statistical analysis consisted of Student´s t-test comparing the pre- and posttest measures.

## Results

The results of the Complex Figure of Rey (figure 1) identified deficient cognitive functions, at times related to the entry and processing phase, and specifically, cognitive processes and mental operations such as organizing, planning, working memory, hypothetical reasoning and inferential analogical relations, especially in relation to the copy phase of the pretest. The results also showed better outcomes, on average, associated with the posttest phase of the evaluation.

| | Pre test | | Post test | |
|---|---|---|---|---|
| | M | SD | M | SD |
| Complex Figure –copy- | 24.80 | 7.6 | 31.27 | 4.1 |
| Complex Figure –memory- | 13.93 | 8.0 | 29.91 | 4.9 |

**Figure 1.** *Pre and Post test results on Complex Figure of Rey*

Mediated learning experience, performed during the dynamic assessment, took into account criteria defined by Feuerstein (2006) ensuring quality-mediated interaction such as intentionality, meaning, transcendence and goal-setting to achieve the objectives. The interrogative style constantly challenged the child to identify functions and processes associated with each exercise. The main mediation criteria used during dynamic assessment included intentionality-reciprocity (e.g., telling the child what was expected in each evaluation item and receiving feedback on what was understood), transcendence (e.g., expanding the information by providing rules), mediation of meaning (e.g., co-constructing with the child the relevance and explicit value of the activity within the cultural context), as well as mediation of sharing behavior (e.g., discovering relationships among the different answers and actions). The intentionality-reciprocity criterion (Feuerstein, Feuerstein & Rand, 2006) was fundamental in two ways: first, in communicating the relevance of the stimuli presented, and second, in being explicit on what was the goal of the task. The explicitness of the goals was manifested in the mediation of the objectives of the task and the regulation and control of behavior needed as part of the reciprocity.

Figure 2 gives an example, of the substantial evidence of changes between the first copy and the second copy, as well as the first memory reproduction from the second.

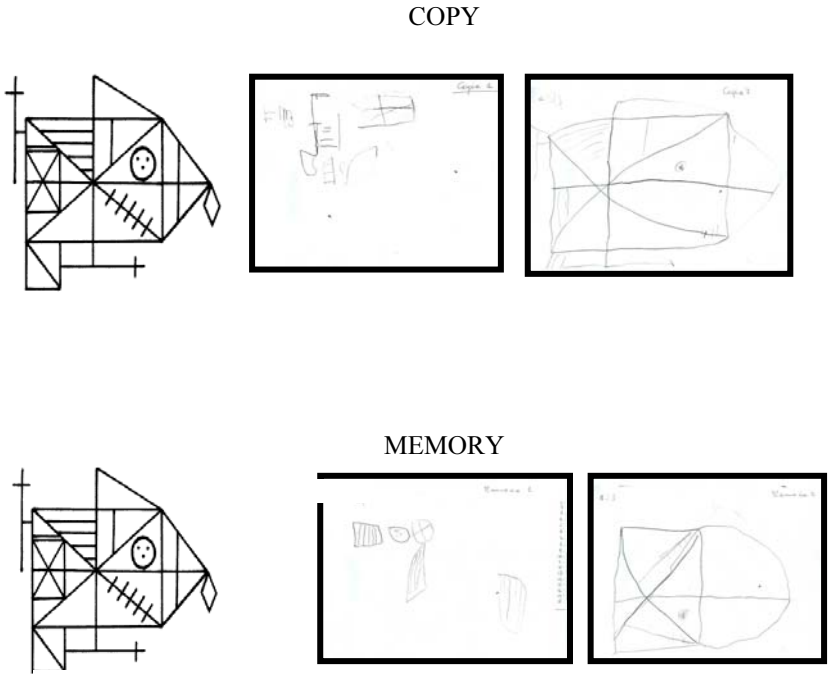


**Figure 2.** *Complex figure of Rey, in a dynamic mode. The left is the model. In the middle is the first memory/copy reproduction. On the right is the memory/copy reproduction after the mediation phase.*

The results demonstrated that children evaluated within a dynamic assessment significantly improved from the pretest to the posttest, both in the copy phase, $t(44) = 7.01$, $p < .001$ as well as in the memory phase, $t(44) = 15.82$, $p < .001$. Some of the cognitive functions involved in the improvement include better attention skills and less distraction, planned and systematic exploratory behavior, the ability to consider two or more sources of information, solving a problem using sequential steps, generalization and transfer from concrete things to abstract thoughts, the ability to differentiate between relevant and irrelevant information, precision and accuracy, and less reliance on a trial-and-error approach to problem solving. Working memory was improved via higher thinking processes.

Qualitative reports from teachers include the perception of students' gains in terms of precision and accuracy in the use of language (verbal labels), differentiation of the relevant from the irrelevant (problem-solving), and self-observation as a key to improvement. A significant change in beliefs about modifiability as a result of the evaluation process can be observed in the following remark made by one of the teachers involved in the process: "It made me realize the importance that I have as a mediator, that I was aware of but did not know how to implement. This kind of evaluation gave me the tools to do so, in the sense that I became aware of what I want to achieve and can try to create that awareness in my students with learning disabilities". These changes in the expectations and clarity of the evaluation process can have an important impact on inclusive education.

## Discussion and conclusions

This discussion aims to describe the different actions and mediated experiences that were proposed for evaluating children with learning disabilities and their relation to more inclusive evaluations. This improvement was demonstrated by the results, which showed significantly better outcomes at the posttest than was obtained at the pretest phase. The results also show changes in terms of the empowerment teachers acquire from a non-static look at the results provided by an evaluation that models the potential of a student with learning disabilities. This change of perspective can be a starting point for a more inclusive evaluation system, with core changes in Chilean education, looking forward.

Supported by the principles of law, justice and equal opportunity, and within the framework of international conventions, Chile has generated a series of public policies and programs in the field of education that are aimed at populations at risk of exclusion. These policies are rooted in discourses on diversity, which, in turn, have a strong link to the concept of inclusive education (UNESCO, 2003). In this context, a special education policy called "Our Commitment to Diversity" has emerged (Ministry of Education, 2005).

The programs derived from these policies make the subjects at risk of exclusion more visible, using diagnostic classification procedures that have become categorical visibility mechanisms. They are basically positivist approaches supported through standardized instruments. In the case of intel-

lectual deficit, using psychometric intelligence instruments from a static viewpoint result in categories such as borderline, mild, moderate, severe or profound mental retardation (MINEDUC, 2009).

Such a categorization frames the identity boundaries of children with learning disabilities with respect to their limits and possibilities for learning. Setting boundaries may define their lives, their imagination and their future, as these boundaries influence the perception they have of themselves and the expectations that others have of them.

Using these categories, the link between identity and expectations can lead to a negative attitude and inadequate generation of appropriate learning environments. Feuerstein (1980) has pointed to a passive-acceptant attitude, generating self-fulfilling prophecies with regard to learning opportunities and development of these subjects.

Given the structure of psychometric intelligence tests, psychologists cannot use them to evaluate modifiability because the tests do not use the techniques necessary to make inferences about the child's learning processes or potential. The LPAD is a systematic attempt to overcome this limitation in intelligence tests and to provide a basis for drawing conclusions about the nature and adequacy of the development of important cognitive functions, the relative ease with which such functions can be changed, the investment required to achieve such a change, and the speed with which modified cognitive functions are applied to new tasks.

As a dynamic assessment, the LPAD represents an individual approach with regard to thought, perception, learning and problem solving processes and an approach in which teaching is a central and active part of the evaluation procedure. The LPAD includes measuring the initial level of efficacy in performing a task (baseline), training thinking principles and troubleshooting, and altering the specific cognitive functions that may be required for the learning itself (mediated learning experience) and subsequent evaluation of newly acquired processes. Such an approach represents a decisive shift away from the normal requirements of classic psychometrics in which the role of the examiner is allegedly to be objective and neutral, giving no specific instruction or even feedback on the performance of the subject. Such tests are generally based on the products of previous learning opportunities rather than direct observation of learning processes.

A different approach to evaluation is needed because of the unsustainability of some of the assumptions associated with the normative evaluation,

specifically because of the large number of children and adolescents with poor performance. In other words, we need methods that enable us to let go of asking whether children can learn and to instead ask how teaching must be provided to fulfill their learning potential. As Caffery, Fuchs and Fuchs (2008) state, DA evaluation may be useful among low-achieving students because, unlike many traditional tests, it does not suffer from floor effects, and it is unique in the prediction of future academic achievement. We would add that DA not only acts on the student but also effects a change in the teacher's expectations, thereby changing the outcome for the student, given the evidence on the impact of beliefs on student performance (Darling – Hammond, 2003). Thus, DA creates a more inclusive basis for the evaluation process.

The results of the study allow us to have a new look on how an evaluation can promote the potential strengths of a child with learning disabilities. It shows that executive functions can be enhanced through the mediation of cognitive strategies absent in deprived cultural contexts. It seems relevant to recall in this context Vygotsky's (1995) point of view that a learning process always involves more than one human being. It is precisely this process of co-construction that allows the common actions between a speaker with a clear intention (mediator) and an active subject (child) to change the context of learning. Evaluation carried out in a child's Zones of Proximal Development (Vygotsky, 1995, 1988) generates a new cultural reality for the child.

The study underlines the importance of various mediation criteria (Feuerstein et al, 2006) in MLE provided through LPAD. Each mediation strategy is constructed from the previous mediation strategy, providing the child with new cognitive abilities that lead to better planning and organizational abilities and better strategies for memory. Mediation involves pursuing answers beyond a first response and acquiring insight (metacognition) through the process of inquiry. This is consistent with the finding of Tzuriel (2013) on how mediation of transcendence becomes the most consistent strategy for predicting cognitive modifiability among children with learning difficulties, as well as the finding that DA, as a central evaluation method, contributes not only to the assessment of cognition but teaches the child how to benefit from mediation in a different setting and context.

In the field of disability, considering the risks of labeling a child´s essence in terms of the outcome for that child, it is important to maintain some distance from positivist approaches to evaluation. With static assessments, we could run the risk of what Taylor (1993) called the false recognition: "identity

is often molded by the false recognition of others. Thus, an individual or group of people can suffer real damage, a real distortion, if the people or society around him, show him as a reflection, a picture or demeaning or contemptible limiting himself. False recognition may cause harm, can be a form of oppression that imprisons someone in a false, distorted and reduced way of being" (Taylor 1993: 20).

The changes that emerge from a dynamic assessment break with the diagnosis as a "permanent monitoring device that sorts, distributes individuals, measures them, and gives them a fixed location" (Foucault 1996: 115) within a social context. We should, as Heidegger (1990) has stated, accept that we are building ourselves with the world, thus, our view of learning should be of an unfolding process, of human existence as an open being, rather than a closed or fixed process. This view would prevent us from speaking of identity as a fixed essence, but rather as an essence that is **between** or **in between** an unfolding process. DA could be a way of looking at the middle ground of this process and generating the interrelated conditions needed to learn, thus evaluating and identifying these conditions during the unfolding process. For a truly inclusive education, we should approach a non-dichotomous construction of the child and the other (evaluator/teacher), focusing instead on the relationship **between** the two and the unfolding learning process, with a co-constructive perspective on what is being evaluated.

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