

THE DYNAMIC EVALUATION OF THE LEARNING POTENTIAL: A PROCEDURE

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Abstract

The research project summarized in this article is based on the dynamic models of the learning potential.

The underlying idea is the construct of the Proximal Development Zone (PDZ) proposed by Vygotsky and later research findings about the PDZ amplitude made by Campione, Brown and Ferrara (1987,1992).

As a result a set of assessment material aimed at the dynamic exploration of the learning potential has been made.

The target consisted of a group of children six and seven years old coming from a public school of La Plata school district.

Data analysis allows to identify progress in performance of the examinees after the help made by the examiner – mediator through the assessment sessions.

It is considered that assessment procedures on learning potential may contribute to confront the challenge of cognitive diversity, conceived as the existence of different cognitive ability patterns as they are showed in the degree of profit of expert help during problem solving.

Key words: Learning potential; proximal development zone; cognitive modifiability; mediated learning; dynamic evaluation

Introduction

The interest in the cognitive processes and the possibility of its evaluation and intervention for improvement have stimulated the development of theoretical and methodological perspectives related to their nature, measurement and modifiability.

The construct of the Proximal Development Zone (PDZ, Vygotsky, 1979) and research concerning the evaluation of learning potential, have established the basis of strategies relating to amplitude.

One way to estimate the amplitude of the PDZ consists of recording the number of incitations or cues required in order for the child to solve a specific problem. An ample PDZ would be characterized as having a low amount of these incitations from the mediator as long as the subject makes progress in solving the task at hand. This decrease is considered as an indicator of the speed of learning and the degree of transference.

In the exploration of cognitive processes, the dynamic evaluation of learning potential is an alternative that allows for the enquiry of the ways the person being examined profits

from the help of the examiner-mediator during the evaluation process in a particular domain or content.

This project has made it possible to go deeper into the theoretical and methodological aspects concerning intellectual potential and to design a set of materials for dynamic evaluation. The application of these resources was carried out by a group of children of 6-7 years who attended a school in the city of La Plata, Argentina.

The paper presents a synthesis of the theoretical- methodological aspects, a description of the phases of the project and some results.

Theoretical-methodological background

The Learning Potential

The origins of the PDZ can be traced to the writings of L.S. Vygotsky:

"...there is no thing other than the distance between the real level of development, determined by the capacity to solve a problem without help and potential development level , determined by the solving of a problem guided by an adult or a friend in collaboration" (Vygotsky, 1979).

The real development level characterizes the mental development retrospectively and the potential development level prospectively.

According to this theory, two subjects having obtained a similar mental age in a standard intelligence test, could vary on the amplitude of the PDZ. Indicators of mental development such as MA or IQ, would not be valid enough to predict the PDZ.

The learning potential relates to latent capacity:

"...the functions that haven't matured yet, but are actually in the process of maturing, in a proximal future may reach its maturity. Right now they are in an embryonic state. These functions could be called "cocoon", germs more than "fruits", profits of development..." (Vygotsky, 1979).

The mediator's action -adult or friend-, facilitates learning, allowing the access and the unfolding of cognitive functions that the subject has not yet mastered :

"...what the child can do today with the help of an adult, it will do tomorrow without any help..." (Vygotsky, 1979).

Situational changes such as increasing the allotted time for performing the task, reducing anxiety or favoring interest, could reveal hidden potential.

The impact of external conditions provokes changes in the subject's behavior that did not previously exist , favoring cognitive modifiability (Feuerstein, Rand & others, 1979).

The idea of learning potential depends on the possibility of increasing the cognitive strategies useful for solving the problem through shared action with an adult or friend.

The emphasis in the learning potential demands the development of resources that allows for the exploration of the implied processes by focusing on intervention.

According to Feuerstein (1980) we need evaluation methods that provide answers to how education can unfold and reveal learning potential.

The dynamic evaluation

The misleading classification of some children as “educable mentally retarded” (Budoff, 1987) and the need to design more efficient interventions for confronting learning problems, have awakened interest in the evaluation of learning potential. The problems arose fundamentally from diagnoses based only on IQ tests.

The name learning potential refers to the evaluation content whereas the term dynamic evaluation refers to methodology, that is to the models or procedures designed to obtain a measure of the learning potential. In his classic text, Feuerstein (1980) coined the expression “dynamic evaluation” in order to describe the procedure.

The dynamic evaluation emphasizes:

- a. the processes of perception, thinking, learning and solving problems (not focusing on products or results);
- b. the acknowledgment of the changing nature of cognitive acts;
- c. the possibility of teaching and learning cognitive processes that can then be generalized;
- d. the distinction between actual and potential levels of performance;
- e. the use of procedures in which the help is part of the test (usually in the test-training-post test sequence);
- f. interpretation of the difference test-post test scores as indicators of potential development level.

“The purpose of evaluating intellectual potential is to obtain an appraisal of general mental ability starting with the presentation of reasoning problems of an adequate level of difficulty for the child, with the purpose of offering the opportunity for learning how to solve these problems. (...) This paradigm of evaluation of intellectual potential consists of the sequence test-training-retest. It also minimizes the artificiality of the test situation, helping the child to become familiar with the test content within a context conceived for maximizing the sense of competence. It teaches the subject to think of a problem when the content may not be familiar and appropriate strategies or the required information are not evident”. (Budoff, 1987).

The learning potential evaluation model tries to determine the performance improvement by comparing the initial answer and the answer after child – adult interaction (Brown and Campione ,1987; 1992). The examiner presents the cues in a graduated sequence. As a

result, the distance between the initial performance and the point the child reaches after mediation can be appreciated.

The tasks used for the exploration are taken from psychometric tests, such as the Kohs Cubes, (Budoff,1987), and the Raven Progressive Matrices (Campione, Brown & Ferrara ,1987; Feuerstein ,1979) administered during the mediated session.

The roles of the examiner are:

- During the pre-test.

Presenting the examinee the task, asking him to solve it independently, observing the initial performance and recording it.

- During training.

Intervening, mediating, helping the child with incitations, cues, examples, illustrations, comments, recording the situational changes that contribute to progress during the search for solutions.

- During the post-test.

Presenting the task asking for independent solving (the task may be the same or similar to the pre-test), and recording the results so as to determine if there has been any improvement with regard to the pre-test.

The examiner monitors the subject's action, his own action and that resulting from the interaction aimed at successful learning.

The subject is "pushed", encouraged, stimulated to select and organize the given information.

The dynamic evaluation consists of an interaction between an examiner who intervenes and a subject that actively participates in the process.

The critical points consist of appraising the extent of individual cognitive modifiability, the ways of inducing positive changes in cognition and how these changes can be maintained (Lidz, 1991).

The modifiability informs about the amount and the nature of the cognitive change. This is related to the control of impulsivity and the development of metacognitive processes.

A very important issue is to determine the amount and the kind of help the subject will need in order to solve a specific problem. Error and failure are useful in determining the quality of the independent performance, choosing the amount and the type of necessary help and appreciating the changes that might be produced.

The procedure is mainly based on individual application. Recent developments include group administration.

The dynamic evaluation has shown sensibility for:

- Exploring qualitative differences in the cognitive process. The differences refer to the way problems are solved (more than on the total number of problems solved), the type

of strategies that are used, the benefit obtained from the clues, the utilization of the knowledge base and the type of answer justification.

- Adapting the methodology of exploration to particular forms of performance.
- Directing strategies for enriching the cognitive process.

The focus of psychometric exploration (the so-called static evaluation) changes into dynamic when it integrates exploration and intervention.

”The dynamic evaluation is not a substitute for the psychometric methodology. It has to be considered as an important addition to the repertoire of the diagnostician. The dynamic evaluation is the correct choice whenever diagnosis is aimed at intervention, exploring the existing repertoire of strategies for problem solving on which to base the desired change. As examiners we have to ask ourselves: What is it necessary to know and what will generate the appropriate information? The evaluation is a cognitive process in itself, not restricted to the number and type of the measurement techniques that are used” (Lidz, 1991).

Dynamic evaluation helps to counteract the effects of the “fulfillment prophecy” (Rosenthal & Jacobson, 1968) that limits expectations about the development and improvement of the cognitive process.

Type of Performance

1. Independent



2. Evident Improvement



3. No improvement



1	2	3
Number of items solved without help	Number of items solved with help	Unsolved items
Index of the actual level	Index of the amplitude of the PDZ	

A dynamic evaluation procedure

Based on the theoretical- methodological foundations, the material for the exploration and analysis of the child`s performance was designed. It developed as follows:

Phase I: Adaptation and selection of non verbal items (classifications) from the Lorge-Thorndike Intelligence Scale.

The activities include: adaptation of sample items, initial ordering of the problems, selection and ordering derived from empirical data, final version of the test including the protocol for recording answers.

Data collection and analysis included the task allotted to different groups, analysis of internal consistency of the item alternatives, statistical signification intra and inter- group differences, and computing the task difficulty level . With this information, a revised version of the test was made.

Phase II: Design of the dynamic evaluation procedure.

Building and adjusting the help (aid) protocol. It was called Graduated Aid Protocol (GAP) and used by the examiner .Then an evaluation sequence was established. Application of instruments in a group of elementary school children.

Content analysis of the test material and procedure.

Analysis of GAP structure .

Phase III: Children performance analysis.

Analysis of performance using the number of correct items independently solved and with examiner mediation. Computation of the observed differences in independent performance and in the final performance (after help)in order to calculate the improvement index.

Content analysis of the answers, looking for tendencies and types of links used to relate the attributes of the stimuli.

Empirical data

The material was piloted with 18 children aged 6\7 , selected ar random. They attended the school n° 28 of the city of La Plata (Direction of Culture and Education. Province of Buenos Aires).

The activities included in the three phases were sampled by 230 children of La Plata school district aged between 6 years 0 months and 8 years 11 months.

Results

The project allowed for the preparation of a set of materials of dynamic exploration that includes:

- test booklet (see Appendix 1)
- scheme for the analysis of cognitive process involved in solving the tasks
- the dynamic evaluation sequence (see Appendix 2)
- Graduated Aid Protocol (GAP., See Appendix 3)
- criteria for the analysis and interpretation of results.

The format is similar to the learning potential tests produced by Guthke & Hamers (1993) and Hamers, Hessels and Van Luit (1991).

The GAP presents the clues in a gradient from maximum to minimum help (Brown and Ferrara). Complementary intervention inspired in the mediation methodology of R. Feuerstein was added.

Quantitative and qualitative treatment of results allows for the categorization of performance as independent, with overt improvement, and without improvement, depending on the help given by the mediator during the evaluation process.

Additionally, justifications or explanations were considered as indicators of response quality: kinds of the links, answer precision and spontaneous correction of mistakes.

Children improve performance after the mediation, independently of initial level . Final performance level shows variation in problem solving between subjects and within the same subject.

The procedures for evaluating the learning potential can contribute to confronting the challenge of cognitive diversity, displayed as different patterns of the ability to learn and/or to profit from help during problem solving.

Identifying different ways and alternatives of mediation-intervention through problem solving, appears to be a way for adapting teaching to individual diversity and promoting learning that is more attuned to the characteristics of the individual learner.

Appendix 1

Instruction Booklet

Tasks selected from Lorge-Thorndike Intelligence Scale (1976) (*)

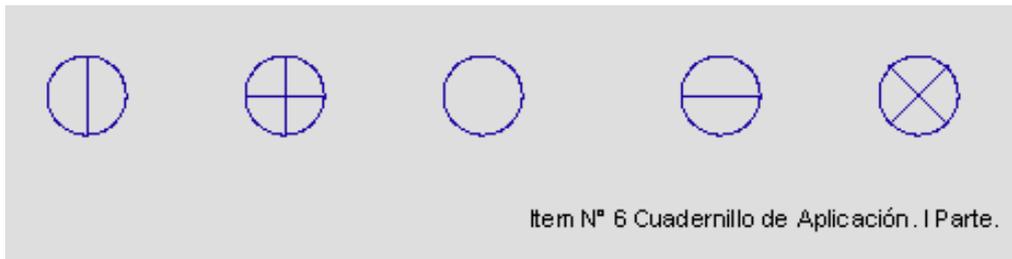
Five levels, two equivalent forms (A and B)

Three batteries (elemental, verbal, non verbal).

Items selected from the total number of the elemental battery (level's 1 and 2, A and B forms):

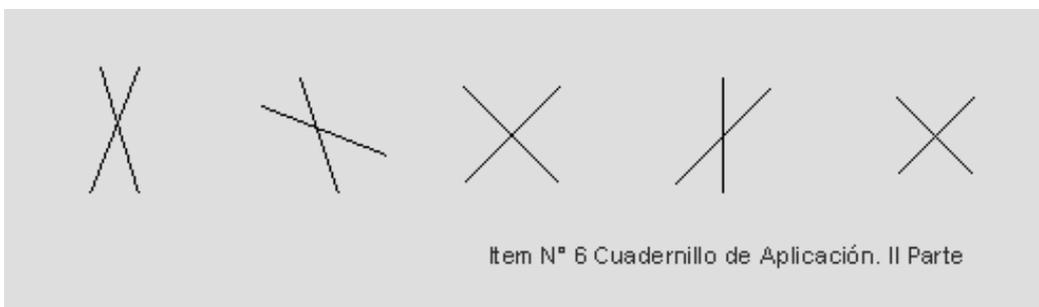
-Subtest 2 .Identifying the element that has “nothing to do with the other 4”, providing 5 alternatives.

Example (extracted from the instruction booklet):



-subtest 3: Identifying “the two elements that have something in common, or that can go together”, providing 5 alternatives.

Example (extracted from the instruction booklet):



The examinee indicated the right answers pointing with his/her finger.

The selection criterion in both tasks was to discard the items considered more liable to cultural influence. Those using geometrical shapes and concepts implying relations of form, size, position, direction, symmetry were maintained.

Appendix 2

Dynamic evaluation sequence

The procedure requires approximately 60 minutes of individual work.

The exploration process can be summarized by four *steps* sequenced in a session:

1. *Initial presentation* following the instructions from the Lorge-Thorndike Scale. Sample items were administered. Once the examiner ensures that the child has understood the nature of the task, he presents the items one at a time asking the child to point to the right answer with a finger.
2. *Questioning* about the reasons for choosing the initial response (whether right or wrong). Justifications were taken as proof of the criteria and strategies used for the child when solving the problem. If the child was successful the examiner encouraged him/her with expressions such as: Very good!, Right!, etc.
3. If the initial answer (independent level) was wrong, because of election or justification, the *mediated help* takes place to orient performance in the direction

of the right answer. Series of *verbal help* (systematized in the Graduated Aid Protocol), is given to the examinee.

4. If in spite of the help given, the child cannot solve the task , the *examiner solves* the problem and justifies the right answer.

Appendix 3

Graduated aid protocol (GAP)

The help given by the examiner during the evaluation sequence has been systematized in the Graduated Aid Protocol (GAP). It consists of a *series of sequenced cues* organized according to *three levels*:

1. –*reasons*, interventions directed to *enquire justifications* of choices ;
2. –*clues*, strategies oriented to *provoking improvement* of wrong initial performance or omitted answer
3. –*solving by the examiner*

Appendix 4

Results

Type of performance

Total items: 38 (First I Part:24 + II Part: 14)	Independent Solved without help	Evident Improvement Solved with Help	Without Improvement Solved by the Examiner
Total of Items	16	20	2

The table shows the results of the exploration. Considering the 38 items (24 from the I Part + 14 from the II Part), 16 were solved without help (42%). 22 items needed mediated help . 20 were solved by the examinee after the mediation and 2 by the examiner. 36 out of 38 were taken as the final successful achievement.

Examples of justification

Item I Part	N°	Right Alternative	Real Immediate Links (1)	– Logical -Verbal Links (2)	Combination of 1 and 2
1		C		this is a circle and the others are triangles	this is a circle and the others have spots, like little tents.

2	C		this is a line and the others are rectangles	*is skinny and the other are fat, circle, more circular. *because this is a long stick and the other are circles
3	D	every one has black spots and this one (pointing d) is white	this is the only one that doesn't have a black square	

Item Nº II Part	Right Alternative	Real Immediate Links	- Logical -Verbal Links	Combination of 1 and 2
4	c-e	are equal, have short and long sticks, but one is lying down and the other is standing still	both are rectangles	
5	b-e		they are two squares	
7	b-c	both are very little and look like eggs		
8	c-e	both are equal like the Xs'of the TATETI	both are an 'x'	
12	a-c		the two that have four points	
14	c-e		the two are triangles and the other three	

			are not	
4	C	They are half eggs and this one is complete	One is a circle and the others not are	
9	C		One is closed and the others open	This is a triangle and the others are like little roofs
12	C	it seems like a cross and the others are like a hammer		
15	D			This (points to the four equal figures) are inclined and this is still, and it is fatter

Notes

(*)Task equivalent to item

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