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DOCTORAL THESIS

ANALYSIS AND SYNTHESIS- LOGICAL AND DIDACTIC PROCEDURES
ABSTRACT

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TABLE OF CONTENTS

Chapter I
ANALYSIS AND SYNTHESIS– FUNDAMENTAL OPERATIONS OF THINKING

Analyzing the operational dimension of thinking, we conclude that mental assimilation structures- among which analysis and synthesis occupy a significant position- can be practiced in order to transform them from external acts into internal acts, from aims of the mental activity into means of it, with the use of the word, or as an element assumed by the knowing subject, or as an element predetermined by the educator through the learning task, through the questions, both associated with a learning situation in which the student is engaged. Therefore, we infer the value that the following elements have for the intellectual development: the learning situation, by its intrinsic nature, the essential method and the didactic procedures used during the learning task, and also the elements we regard as the main possessors of words which generate changes at the mental level. In the latter category we include: the didactic task and the questions used by the educator to predetermine a mental engagement containing the operational dimension of thinking.

In this paper, we mainly study two of the fundamental thinking operations- analysis and synthesis, aiming at deciphering both their specificity and the context in which they are situated when they evolve from extrinsic forms to intrinsic forms, within specific activities, from their status of aims of the activity to that of means of it, respectively intellectual skills. Our preoccupation is to reveal those particular characteristics of the mental operations that can be exploited during the learning process as basis for actions aiming at developing intellectual components.

A fundamental thinking operation, resulting after some external acts have been interiorized, the analysis is presented from the viewpoint of its specific features, as a link which include a structure in the process of thinking, an element with neural outcomes, a distinguishing element of the didactic activity, and a decisional element in the learning activity.

Synthesis and analysis are interrelated operations. From a chronological point of view, the synthesis is a result of the analysis, situation that implies the idea of restoring the balance during the process of thinking. The subtle mechanism of synthesis implies also the *identifying of a logical principle of development and interaction of the object* previously analyzed, after having been correlated to other objects in whose class it was included.

In order to interpret the intrinsic mechanisms of the analysis and synthesis as mental operations, we have decided consider *the teaching material that the student is faced with* (intuitive material, verbal intuitive material, notional and verbal material) as a criterion for analysis. We determine forms of analysis and synthesis, forms that are expressed by means

of indicators. Each of the forms is presented in connection with an example taken from the educational practice. We determined the following forms of analysis and synthesis, according to the criterion mentioned above:

Diffuse analysis is confirmed when a little student presents the object of perception by enumerating its constituent elements, after having observed a picture. Without constantly keeping a singular viewpoint regarding the criteria for deciding what to present, the student lists, as a result of this mental operation, a series of both main and inessential features of the element or elements observed in the intuitive material.

Elementary analysis represents a form of mental operation performed at a low level, respectively, an elementary selection which mainly consists of choosing consecutively the solutions for solving a problem.

Analysis through synthesis is the operation through which the analysis is determined and oriented towards an aim demanded by the synthetic act of relating the conditions to the requirements of the problems.

We designate the elementary analysis, the diffuse analysis, and the analysis through synthesis, as forms of analysis that are attributes of the elementary level of thinking.

Processual analysis is an operation that implies, through its specific intrinsic mechanism, relating both to the present state of affairs and to the past situation of the object, the being, or the phenomenon. The operation is performed successively by alternating the orientation towards the present moment, the past and the future of the process, and the expected result is represented by noticing the evolution or the involution of the element that corresponds to the object of the operation of thinking involved in the actual situation.

The analytical description of two elements to compare, followed by general synthetic considerations, represents an operation of thinking that implies one-to-one confrontation of the elements belonging to different entities, presented in real form, verbal intuitive form, or verbal and notional form.

Multilateral analysis of objects or phenomena is performed aiming at generalizing comparison. It represents the basis for judgements, reasoning, and scientific concepts. Analyzing multilaterally the objects and phenomena, the student makes the first important steps towards the assessment and the isolation of the essential determinative aspects of them, and, in addition, it is formed a basis for generalization- the process of integration in one unit represented by the concept.

Individual or unimodal synthesis is realized by relying on a set of elements that all belong to a particular individual object. The synthesis is performed on a homogenous material that results from a previous unidirectional analysis.

The plurimodal synthesis becomes operational in the situations when it is applied to different groups of elements and its aim is to select those that have common or similar features, and to build a superior unit based on these. This will represent a category- which means the unit will represent an aggregate or a class of individual similar objects.

The elementary forms of synthesis are the operations performed as an aim of the student's specific activity. These are the diffuse synthesis and the processual synthesis.

Diffuse synthesis is the operation of thinking that leads to nonselective juxtaposing, in presenting its result, of some characteristics- either important or inessential, of the object or phenomenon observed.

Processual synthesis is the operation by which the child is required to rotate further an image at the mental level, in order to discover the missing image. The identification of the final position of the image involves an effort of imagination and a synthetic effort, through which the process is understood in its evolution.

The synthesis of confrontation is the operation complementary to analysis, based on the description performed after selecting elements that connect or differentiate the two compared entities.

Multilateral synthesis is the clue of a formal thinking. In absence of a particular preoccupation, the occurrence of this level of synthesis development is quite infrequent. It is less frequent as the age of the subjects who might perform this operation is younger.

The analysis of the attributes of the mental operations (automation, generalization, instrumental specificity, completeness) from a genetic viewpoint is important for our work, since *taking into account the characteristics of the operations of thinking in the process of development by transposing them in objectives that orientate the educational and formative process* that we have established to plan and accomplish, becomes clear and necessary.

Subsequent to the analysis of the interactional model of the cognitive function, we anticipate the following idea as a premise that represents a basis for creating the experimental outline of the research we perform: involving very young pupils in performing the tasks that imply a complex cognitive effort and require the involvement of the elementary mental operations: analysis and synthesis- at a high level which means the training of deep and higher thinking, and also the non-cognitive appreciation of the learning task.

Bloom's taxonomy regarding the cognitive domain, and also the in-depth analysis of this, realized by L. Anderson and L. Sosniak, "the new taxonomy" proposed by Z. Maranzo contribute to a better understanding of analysis and synthesis. They are considered two important behavioural stages that require to be engaged in terms of actual actions of those who make progress in knowledge. Both operations, understood either as capacities, or as behaviours, which are classified in this paper into essential elements, are a component part of the intellectual skills class and represents, in fact, means of operating with information.

In specific didactic situations in which analysis and synthesis are behaviours that can not appear without the "inferior" ones from the taxonomy having been previously engaged in solving the learning tasks, we speak about *inferior analysis and synthesis; they are operations considered as aim of the action.* The higher capacities- analysis, synthesis, evaluation- may be also directly approached, without the previous stages. When analysis and synthesis are primary objectives of the students' activity, we deal with the involvement of *higher thinking*.

In one of the subchapters of the second chapter we demonstrate the existence of powerful connections between analysis and synthesis, and also between them- understood as separate entities or together- and important mental abilities like creativity or memory. We also identify- based on a careful analytical approach- the links created during the specific process of thinking, between analysis and synthesis, and other significant mental operations: abstractization, generalization, concretization, comparison.

Learning can not take place without the involvement of the operations of thinking, and analysis and synthesis occupy an important, fundamental position in this category. The learning process, characteristic of the knowing subject, does not exist outside the analysis and synthesis processes, regardless of the form in which they appear: aims of the cognitive activity, traits of the deep or higher thinking.

Analysis and synthesis play an important part in building the learning results: concepts, skills, abilities, capabilities, capacities, cognitive schemes. The essence of their intervention in the ample processes that lead to their achievement is presented in a subchapter of the second chapter.

In the educational practice, the student's interaction with the concrete teaching materials, and also with their substitutes together with saying aloud the meaning and the

essence of the action performed with these, predetermine the engagement of low level thinking, and the situational knowledge is correlated to a situational learning.

We postulate that "*higher level thinking*" is the cerebral act "covered" in the internal, mental language, concretized in ideas and concepts. When the input-material for learning something new is verbal-intuitive, analysis and synthesis operations overcome the stage when relating to the real image is absolutely compulsory.

We establish as components of the concept "higher level thinking", the operations of thinking in images and thinking in action, respectively problem solving. We consider that analysis and synthesis operations are involved in both categories of mental processes, and contribute to their successful development to accomplish an established objective.

Thinking in images or visual thinking implies performing the same mental operation as in the situation when the knowing subject operates with real objects. The mental rotation and the scanning of an object or of a succession of objects are operations typical for thinking in images and, from a psychological viewpoint, they are identically realized.

Analysis and synthesis involvement in the training of the image thinking, considered a form of higher thinking, reveals the possibility of their transformation from the activity aims, into means of the activity.

Thinking in action is, in our view, an aspect of higher level thinking, involved by the student in the context of real learning situations. Performing them implies pursuing at least one objective- integrated in the phrase: "solving of the problem"- without having the means to achieve it. The engagement of thinking in action is related to an analytical and synthetic act performed with the help of a visual or a prepositional aid. Therefore, to perform analysis and synthesis as features of higher level thinking means to set to work dynamic cognitive algorithms to elaborate the information contained in mental images or in sentences.

We decipher a subordination relationship, in some instances, between the analysis and synthesis operations, and the operations that are only specific to human beings: abstractization, generalization, concretization, even comparison in certain aspects we previously mentioned.

Thus, when the two elementary thinking operations are not perform in order to identify the essential traits of a whole or to identify the logical principle of development and interaction of the object of knowledge previously analysed, they can be determinative element of other mental operations. In other words, when analysis and synthesis guide abstractizations, generalisations, concretizations, and comparisons, they appear as means of the intellectual activity and they are features of the deep thinking.

From the viewpoint of the taxonomy of educational objectives, analysis and synthesis involved by the didactic tasks of processing, use, and investigation of an object of knowledge aiming at its subsequent assessment, are activities that imply deep thinking.

From a pedagogical perspective, we are interested in the mechanism through which we can predetermine the engagement of analysis and synthesis on a generating level-potential for passing judgements, intellectual conclusions, attitudes of an epistemological value, even if they are not actually required in the didactic activity.

The forms of analysis and synthesis identified by us in the previous subchapters can be, in our opinion, classified by relating to the nature of material used, into the following distinct categories:

The category of analysis realised at a low level	The category of synthesis realised at a low level	The category of analysis realised at a medium level	The category of synthesis realised at a medium level	The category of analysis realised at a high level	The category of synthesis realised at a high level
diffuse analysis	diffuse synthesis				
elementary analysis		elementary analysis	synthesis of confrontation		
analysis through synthesis		analysis through synthesis			
analytical description		analytical description			
	unimodal synthesis		processual synthesis		
	plurimodal synthesis				
	formal synthesis				
				abstractization	generalization
				concretization	concretization
				processual analysis	processual synthesis
				multilateral analysis	multilateral synthesis

Table 1. The forms of analysis and synthesis

Identifying modalities to improve coordination and leading of the student's learning activity, so that they engage deep thinking and higher level thinking, represents a fundamental aspect we intend to take into consideration when we will plan formative modalities of intervention upon the mental operations of analysis and synthesis that teachers use in primary school. Keeping the same coordinates of indicators that mark deep and higher level thinking, we propose to delimitate the *theoretical bases of the methodological alternatives that can be used to accomplish the goal mentioned above*.

By means of the formative programme designed and put into practice, deep thinking and higher level thinking, understood as we previously mentioned, are studied as formative effects of the educational acts in which analytical and synthetic algorithms that elaborate information are combined with didactic tasks that force the student to perform analysis and synthesis.

Due to the fact that the experimental process refers to analysis and synthesis development by means of suitable educational programmes, so that they become specific procedures of intellectual work, we examined the aspects specific to analysis and synthesis in two stages of thinking development, stages in which they are superposable with some formative acts: the preoperative stage and the concrete operational stage. The study realised is useful, in the whole structure of this paper, for establishing the correct starting point (from the viewpoint of the psychological data currently accepted) of the formative action through which analysis and synthesis can transform into logical didactic procedures,

components of an the intellectual style of the person who benefits from the effects of the cognitive training programme.

Chapter II
ANALYSIS AND SYNTHESIS IN THE LEARNING PROCESS

The concern to discover the practical details of the systematic practice of analysis and synthesis within the didactic strategy, leads us, in the second chapter of this paper, to the exploration of the median elements of any didactic context- the didactic methodology, the didactic strategy- in order to identify the place of analytical and synthetic procedures inside them. From our viewpoint, these two educational process components are considered the most valuable for determination and facilitation of practice of the analysis and synthesis as logical and didactic procedures, regarding them as being directly and determinatively related to the educational process finalities, mainly to those with a minimum degree of generality- operational objectives. We propose a pattern of structuring the educational process components, which suggests the direction of creating a model for training operational intellectual abilities, oriented towards the student's intellectual development. By means of this model we notice the determinative position the didactic procedures- and also, in our opinion, analysis and synthesis- occupy within the learning process. The model is useful for understanding analysis and synthesis as both conditions and results of the learning process.

Through the theoretical analysis we perform in the second chapter, we are concerned with identifying the optimal modalities of incorporating in the didactic strategy those learning situations that imply the student's engagement in the problem solving process by means of analytical and synthetic procedures. For this reason, we have taken into consideration, from the multitude of criteria for defining the strategy, identified in the specialized literature, *the criterion of learning mechanisms adopted by the students* (learning style), and also the *criterion of the pedagogical and didactic conception validated in the contemporary period*, both based on the paradigm of activism, to configure a theoretical and practical framework within which the training of intellectual operational abilities finds its appropriate place and function.

We identify the formulas that synthesize the illustration of the moulding connection between the actional essence of a didactic strategy and the student's learning style, respectively linking the type of learning experience the teachers proposes for the students, and the particular manner of the involvement in the learning act. We also underline the need to go through all the stages of the learning cycle; in addition, the teacher must create learning experiences that provide equal opportunities for all the learning styles. Only in this manner real leaning can develop.

Subsequent to having studied the relevant data in the specialized literature, we establish, within a table, *the involvement that mental operation of analysis and synthesis may have in putting the strategy into practice*, by means of mentioning the elementary forms of analysis and synthesis operations.

Planning and practice of the didactic strategies starting from the model we conceived, is considered by us valuable and valid for the student's cognitive training, according to the directory principles the current (and future) curriculum is based on.
The directory principles of the curricular project correlated with the model presented by us are:

- progressive construction- the students permanently progress during the educational process, and each development stage is built on the acquisitions in previous stages;
- flexibility and differentiate route- the curriculum answers the students' different needs (the possibility to choose certain activities, optional subjects, textbooks, etc.);
- relevance and extent of the curriculum- the finalities and the contents are adapted according to the social requirements and to the students' development level, and offer a wide range of learning situations and varied educational contexts.

We prefigure, even from this moment of the theoretical approach, the distinctive characteristic of the formative training that will constitute the essence of the research. Within the formative training, the selected didactic strategies contain dynamic algorithms of processing information that will combine with different learning tasks that demand analysis and synthesis.

We also prefigure that the didactic approach will be based on the *experiential learning model*. This allows the development of didactic strategies through which analysis and synthesis can be practiced, in an explicit manner, at school. This enables the students to go through a learning experience, to express themselves, to sustain their viewpoints, to discuss, to assess. Adopting such a model of didactic approach in the educational practice is valuable due to the potential is has for combining the types of thinking in which analysis and synthesis "reveal" their virtues of logical and didactic procedures able to generate ways to be and ways to act.

The sequences of the approach are:

Sequence 1- *construction*- is the stage when, by actually relating to what they learn, by giving meaning to the elements they encounter, the students "built" the reality. The process takes place by relating to many codes that are valid in the real context in which the learning process is developed. The codes are represented by religious belief, taboos, conventions, customs, ways of thinking, cultural traditions, rational arguments, and patterns of interpretation. All of these have been acquired throughout the student's existence, for the reasons that he lives in a certain family, in a group of friends, in a school, therefore in certain pieces of the local community he belongs. They generate an apperceptive background that leaves its mark on the cognitive behaviour of those who continue to acquire knowledge.

Sequence 2- *reconstruction*- involves processing by filtration, of the different codes mentioned above. It is an essential stage that involves a student's own biography even within the process of exterior element filtration, event sustained by analysis and synthesis practice in an active and constructive manner.

Sequence 3- *deconstruction*- it is the stage when the student's identity itself is considered, because their conceptions, their certainties, and their habits are critically reassessed.

We establish, from this moment of the theoretical support of the formative approach, the set of values it will be based on: opportunities for social interactions,

independent investigations, independent study, expressing of creativity, and preparation for different learning styles.

We consider that, in the case of organizing learning activities according to the demands for learning organization in a constructivist environment, appear both the need and opportunity to practice analysis and synthesis, as components of an activating didactic strategy.

Regarding didactic methods and procedures as intermediaries of learning at school, we perform, in the second chapter, an approach of the didactic method in the process of learning, an analysis of the learning situation, of the configuration of the logical and didactic procedure in learning, and we also create a taxonomy of the learning tasks and questions that engages analysis and synthesis operations.

The conclusions drawn from the theoretical analysis which are useful for building the analysis and synthesis training model are: *the nature of the didactic strategy adopted during the learning process is decisive for choosing the didactic methods and procedures; a method has a formative potential depending on the procedures it includes; it can have that potential during the long complex process in which student reaches from the so-called position of "engaged in a development predetermined by others", to that of "creator of its own development path".*

We propose a work definition for the concept of method: *The didactic method represents a homogenous system of didactic procedures, organised upon the teacher's or the student's understanding and assumption of the characteristics of the learning situation, of the pre-established objectives, which sustain the efficient solving of a learning task, and performing a formative act of constructive reference to the studied reality.* Related to this meaning of the concept "method", the procedure is an *algorithm that starts and maintains the learning process.* With this meaning, it can form some analytical and synthetic algorithms. The working definition we adopted for the didactic procedure is: *an intermediary factor between the external reality that is going to be internalized (learning contents) and the mental processes which are hereby activated as constituent elements of a cognitive strategy.*

Succeeding the refining of the analysis of the didactic procedure characteristics, we consider that *creating the pedagogical planning by connecting several procedural algorithms, leads to the knowing subject's fast, direct and productive advance towards the formative outcome of their acts, effect that may be identified at the superior level of their thinking engagement.*

From the perspective of the finalities of using the methods in instructional educational activities, *the training of analysis and synthesis operations will prove to be an efficient act only when it is structured in an integrative manner, by introducing several methodological elements which, in their nature, enhance students' engagement in the "start-up" of some analytical and synthetic algorithms.*

In this chapter we analyze several didactic methods from the perspective of the procedures they subsume, in order to identify some focal points for the theoretical underlie of the issue of analysis and synthesis, regarded as logical and didactic procedures. The methods subjected to the analysis are: experiment, demonstration, learning through discovery, case study, SINELG[1] , "I know, I want to know, I have learned", exercise, and modelling. All of these possess the following attributes:

- ❖ intensely mobilize the students' mental forces of knowledge;
- ❖ can be determinative for solving more learning tasks by the students;
- ❖ involve minimum intervention from the teacher;
- ❖ involve few focal points from the teacher.

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[1] interactive grading system for making reading more efficient

For each of these methods we identify the proportion in which analysis and synthesis, regarded as activity aims or means for superior mental operation engagement appear during its stages. We identify the frequency of practice of the higher level thinking, respectively the deep thinking through analytical and synthetic procedures, and also the frequency of training the elementary thinking, using the same procedures. We conclude that the training of higher level thinking, in its aspects previously mentioned- higher level thinking and deep thinking- is possible by including in the didactic strategies of several teaching methods, due to the mobilizing potential owned by that the didactic procedures they contain. In this category we include: demonstration, learning through discovery, case study, SINELG, "I know, I want to know, I have learned", and modelling.

We conclude that the power of elementary operation engagement, as means of intellectual activity is proportional in the case of the methods which are part of critical thinking methods category, and in case of the traditional methods. On this basis we affirm that an intellectual activity training programme is productive even if it combines in its strategy, the traditional didactic methods with the methods typical for critical thinking. The analytical and synthetic procedures assumed by these methods *indirectly determine deep thinking and higher level thinking practice*, without the need for a dynamic algorithm that predispose the student to perform analysis and synthesis.

The theoretical conclusion mentioned above creates the opportunity to pre-establish as the direction of the research we perform, that according to *which intellectual training is generated by the student's engagement in the activity planned by means of a didactic strategy that includes critical thinking methods combined in a dynamic structure with traditional methods*. This is the action principle that will represent the basis for the didactic activity in which the students from the experimental lot will be engaged during the research.

The structural analysis of several active methods leads to drawing out several elements of analysis and synthesis algorithm, which we regard as valuable because they can underlie the model of cognitive training we conceive and put into practice within the formative experiment. They originate in the procedural stages of several methods with potential in deep and higher level thinking training, linked to the analytical and synthetic marks which the students activate at the cognitive level, when they follow the way illustrated by the method. Identifying these dynamic algorithms of analysis and synthesis as means of intellectual activity, in the form of a picture, allows us to emphasize the connection between analysis and synthesis performed at a medium level, named hereinafter GP (activators of deep thinking), and the moments when these mental operations are engaged by the subject in a superior level of performance, named hereinafter GS (activators of higher level thinking). In both situations, the analysis and synthesis operations are revealed as means of the intellectual activity.

We identify:

A.   Algorithmic approaches which include stages of analysis and synthesis in processing information at the level of knowing, understanding, application:
- Dynamic algorithm type 2GP-GS
- Dynamic algorithm type 2GP→2GP
- Dynamic algorithm type 2GP↔2GS

B.   Algorithmic approaches which include stages of analysis and synthesis in processing information at the level of: analysis, synthesis, and evaluation:
- Dynamic algorithm type 2GP+1GS↔1GS↔2GS+1GP
- Dynamic algorithm type 1GS→1GS→1GS
- Dynamic algorithm type 1GP→1GS→1GS

We regard the learning situation as the context in which the students are placed in order to determine them to perform those activities that ensure acquiring knowledge, forming intellectual and movement competencies, attitudes, moral, spiritual, and aesthetic values. Based on this meaning of the concept, we integrate the didactic procedure in the structure of the learning situation, by correlating it with the cognitive strategy, starting from the explanatory model provided by Romainville, of these two fundamental elements of the learning process. The learning situation, in which the students are involved, represents a focal event of their cognitive energy, and the learning task is capable of determining the students' engagement in performing certain mental operations, of certain amplitude, placed on a certain stage of value, which can be determined by relating it to the whole structure of mental operations.

The sense and orientation of analysis and synthesis processes are determined by the relation between *the motive and the aim of the activity*. Consequently, for analysis and synthesis operations, the motive and the aim of the activity in which they integrate, it is established a criterion according to which they are performed. The transfer of this general human constancy at the educational practice level allows us to identify *the operational objective and the didactic task* derived from it, and also the *questions* the teacher uses to direct the students to accomplish the task, as determinative elements for engaging and training *the analysis and synthesis operations.*

If the aim or the motive of the activity is represented by analysis or synthesis and it is consciously led towards performing these mental operations, we deal with an elementary functioning of these operations. However, when the analysis or synthesis operation is automatically performed, we speak about the superior level of involving these operations in the process of thinking, and by this we identify that analysis or synthesis reached the level of intellectual skill. Reaching this evolutive stage of mental operations, whose mechanisms constitute the object of the theoretical analysis we perform, signifies, from a pedagogical viewpoint, the movement from analysis and synthesis *as aims*, to analysis and synthesis *as means for achieving other aims.* We conclude mentioning the underlying idea from which an important line of the experimental act we perform within our research will develop: *for becoming an intellectual skill, it is necessary that analysis and synthesis manifest themselves as procedures typical for deep or higher level thinking.*

Theoretically, a learning situation occurs, is put into practice, by applying the didactic procedures and always leads to a new learning situation in which what was previously the result of learning (mental processes of operating with real data) may become conditions (didactic procedure) for the new task.

The first characteristic aspect mentioned above correlates with an essential element involved in any educational situation, respectively with the element that ensures the sense and the direction for the didactic approach oriented by the operational objectives: the learning task.

Within the conceptual analysis we carry out, we allocate special attention to the learning task, due to its potential to generate analysis and synthesis operations engagement by the one that internalize it during the learning task development.

The learning task is regarded in contemporary pedagogy as an essential statement used during the learning process, which is interdependently linked to an operational objective. The connecting element between the two is represented by their nature, their essence. For the optimal progress of the learning process, the existence of an identity relation between components of the operational objective and the fundamental component of the learning task is necessary. The identity of elements is assessable by means of the action verb used to designate the behaviour expected from the students, as a result of involving them in the learning process.

The cognitive tasks that oblige the students to perform deep analysis and synthesis are those that have a direct connection with the learning situations which are created by the teacher in such a way that they determine the students to discover knew knowledge, to solve problems, to identify rules and principles from concrete situations they are faced with. Based on this finding, we anticipate tasks and questions that determine the student to engage in performing several mental operations of analysis and synthesis at a superior level of thinking involvement.

The particularizations we make in this subchapter demonstrate that the involvement in planning learning situations that contain the main types of acquisitions and cognitive manifestations integrated in the cognitive level, represents an opportunity for training deep and higher level thinking, through the engagement of analytical and synthetic procedures.

Chapter III
THE BASIS OF THE ANALYSIS AND SYNTHESIS OPERATIONS TRAINING PROGRAMME

In the third chapter, on the basis of the specific acts presented, in the planning stage of the experimental approach for identifying several modalities to train explicitly analysis and synthesis, which leads to their transformation into logical and didactic procedures known by the students and which contributes to improve the students' intellectual activity style, we planned an original methodological context that contained didactic approaches that facilitates the studying of the same number of themes within an optional subject.

Therefore, we planned the intellectual training design, focused upon analysis and synthesis practice and upon their transforming in logical and didactic procedures by constantly relating to the text entitled "Sânziana", which is included in the thinking development programme designed by Matthew Lipman and named "Philosophy for children". Performances which have a value of principle, and which we expected the students to perform at the end of the formative programme, have included the analysis and synthesis thinking operations. They were synthesized as directory formative principles: correctness of reasoning, academic performance, creative thinking, changes in the students' behaviour.

There is a set of framework objectives (the forming of concepts, forming of classification principles, comprehension) and reference objectives that we formulated in an original manner, in order to guide the students during the didactic approaches towards the targets mentioned above. Similar to these finalities and principles, the values and attitudes mentioned as aims of the formative training programme conceived by us, have contributed to the formulating of the operational objectives for each of the sixteen didactic approaches we planned and put into practice in case of the students in the experimental classes. The general and specific finalities of the cognitive training we refer to are those which prefigure the order in which they are pursued, within each didactic approach, the general cognitive operations, by correlating them with the taxonomic stages of the cognitive domain, but also with the stages of the experiential learning process.

The learning situations the students go through during the formative programme, by their name itself, synthesize the nature of behaviour the students particularly engage by assuming the learning task they have to solve (defining the problem, stating the objectives, observation exercises, asking questions exercises, comparison, classification, ordering, representation, identifying the attributes and the components, identifying the patterns and the relationships, identifying the main ideas, identifying the errors, intervention, elaboration, summarising, restructuring, establishing criteria, and examination). The set of didactic procedures used by students during the cognitive training programme necessarily implies the engagement of analysis and synthesis mental operations.

By means of the formula we adopted for planning the formative approach conceived by us, we wanted to identify the value of optimal combination of three major components of the educational process, which can determine and explicitly facilitate the analysis and synthesis training: *the logical and didactic procedures* from the didactic methods and procedures system, *the dynamic algorithms for processing information*- fundamental elements of the didactic strategy, *and the learning task/ the questions* typical for the learning situation created in the usual context of traditional educational system.

Underlying the formative approach conceived as independent variables for the research performed by us, was the model for practicing analysis and synthesis as logical and didactic procedures.

We assured that this is relevant from the viewpoint of the structure it requires, and, for this, the thinking operations that were the objects of our research were correlated with all the levels the educational finalities are placed. For the guarantee of the functional relevance of the model we structured, we wanted to ensure, through its contents, the positive transfer of analysis and synthesis engagement from a performance required by the nature of the task received from the leader of the pedagogical act, to an approach that is the result of independent use of these procedures. To anticipate the didactic approaches towards this direction, we considered as valuable the following:
- harmonising the modalities of engaging, stimulation, and appreciation of the logical and didactic analysis and synthesis procedures used by the teachers and by the students;
- "preparing" the learning context in such a way that it determines analysis and synthesis engagement in the complex act of the knowledge process;
- diversifying the types of learning task that require the use of analytical and synthetic procedures;
- using several "models" to implicitly and explicitly teach analysis and synthesis.

Through all the specific actions performed by us, and mentioned above, we wished to form an applicative perspective, with an educational nature, regarding the efficient formative approaches for the development of analysis and synthesis operations, aiming at their transforming into logical and didactic procedures, which can be applied in the students' learning activity, and can become important features of their style of intellectual work.

Chapter IV
EXPERIMENTAL APPROACH OF ANALYSIS AND SYNTHESIS AS LOGICAL AND DIDACTIC PROCEDURES

The theoretical premises that underlie the experimental research we perform are synthesized by taking into consideration the theoretical and applicative perspectives we have presented in this paper until now. They are the result of complex synthesis of viewpoints from which analysis and synthesis may be approached, as fundamental thinking

operations, of their functioning within the formal acts leading to performance and learning results, on the one hand, and, on the other hand, from the synthesis of the applicative perspectives that outline the educational act of developing the mental operations mentioned.

The theoretical principles are presented in a concise and synthetical manner in this chapter.

The goals of the experimental investigation we have pursued during the research are:

- Planning an intellectual training model for practicing mental operations of analysis and synthesis, aiming at transforming them into logical and didactic procedures;
- The experimentation of the function of the intellectual training model by transposing the action strategies characteristic for it, in the area of the development curricular cycle from the primary school stage;
- Determining the quantitative and qualitative influence of the strategies specific to the action model, upon the quality of the intellectual competence and the cognitive performance of school students in the development cycle stage.

A model for training analysis and synthesis mental operations aiming at transforming them into logical and didactic procedures is conceived and presented in the forth chapter of this thesis. It synthetically presents the theoretical perspective we developed regarding the theme. It also represents the basis for the practical approach we perform in the experimental part of the research. The model conceived by us is graphically represented in a figure made of a truncated pyramid which upholds a cone. The truncated pyramid situated at the model basis stands for the experiential learning stages the students go through within the learning process, correlated with the taxonomic stages of the cognitive domain. The structural components of the cone are the analytical and synthetic marks that engage deep and higher level thinking by means of the dynamic algorithms for processing information. These algorithms are combined with different learning tasks that oblige the students to perform analysis and synthesis. We demonstrated the relevance the model has from the viewpoint of its internal structure, and also its functional relevance, in the forth chapter.

Starting from the model we developed and on the basis of the theoretical principles we presented, a formative and instructive experiment takes place. The main goal pursued by us during the research we perform is creating the conditions for evaluating the extent to which the use, during the learning process, of strategies of explicitly teaching and learning the dynamic algorithms for processing information, determine or sustain the transforming of analysis and synthesis in logical and didactic procedures.

For the investigation, we establish the following general hypothesis (*Ig*), and on the basis of it we structure and we subsequently perform the formative experiment:

The consistent use of the dynamic algorithms for processing information, which are subordinated to the taxonomic stages of the cognitive domain, within an educational programme that valorizes the experiential learning model as a constructivist learning principle, provides a favourable context for transforming analysis and synthesis into logical and didactic procedures known by students, with significant effects upon their learning performance optimization.

From the viewpoint of the general hypothesis we presented above, we identified the following as main coordinates for the experimental investigation:

- planning and practising the didactic strategies from the perspective of the philosophy and educational practices promoted by "Philosophy for children" programme and by the experiential learning paradigm;

- monitoring the effects these lessons bring in the plan of the students' intellectual strategies.

The experimental investigation made within the parameters mentioned above needed taking into account and verifying the following specific hypotheses (Is):

Is 1- Organizing the learning situations by combining the working tasks with didactic procedures that mediate the engagement of complex cognitive operations, in a succession identical with the taxonomic stages of the cognitive domain, determines the occurrence of qualitatively superior results of analysis and synthesis practice, objectified by:
- increasing the frequency of deep and higher level thinking engagement;
- increasing the students' independence of using dynamic algorithms for processing information;

Is 2- Training the students to use the analytical and synthetic procedures in the acts of processing information determines an intellectual activity that has positive effects on a double level:
- at the level of performance by improving the cognitive learning accomplishment;
- at the formative level by transforming the analytical and synthetic procedures in characteristic and autonomous elements of the learning strategies adopted by the students.

The second coordinate of the experimental research, related to the monitoring of the effects that the activities planned and organized as we previously described induce, requires us to specify, within the context of our research, that the cognitive autonomy (objectified in self-regulation and control that students can exert upon their own mental operations) is a typical characteristic of intellectual work strategies.

The structured and coherent set of the observing and experimental approaches, specific to the research we performed, is based upon the following specific objectives:

O1- Observing the state of things regarding the effects of analysis and synthesis training in the external conditions dictated by the current curriculum corresponding to the second curricular cycle – "the development" cycle, by interpreting the students' performance level;

O2- Identifying the learning activities typical for the"Philosophy for children" educational programme, which has potential for engaging analysis and synthesis operations, by analyzing the curriculum support for this programme;

O3- Structuring a formative programme to train analysis and synthesis in external didactic conditions, which bears the sign of combining analytical and synthetic procedures within the dynamic algorithms for processing information and in correspondence with the taxonomic stages of the cognitive domain;

O4- Planning, organizing and performing in a unitary system the learning situations that contain learning tasks which predetermine explicit practice of analysis and synthesis operations;

O5- Using adequate instruments to measure the students' progress in using analysis and synthesis as procedures within their own intellectual activity (in forming the concepts, the skills, and the operating structures);

O6- Assessment of self-regulation and control (as marks of cognitive autonomy) students can exert upon their own mental operations of analysis and synthesis, as a result of their engagement in the formative activity, by quantitative and qualitative interpretation of the students' results when using investigation as a learning method.

For identifying the capacities of using analysis and synthesis forms as logical and didactic procedures, of the participants in the research, we use the method of school documents investigation. The results of applying this method make possible the statistic comparison between the four experimental classes and the four control classes. Following the specific path of this method, we use the school documents, respectively the registers of the classes the members of the experimental lot and the member of the control lot belonged to.

By means of written papers examinations, we intended to discover the students' possibilities to perform analysis and synthesis on several objects, phenomena, concepts, and we also wanted to discover the level analysis and synthesis occur, relating to students' age, class, and individual traits.

The study of the learning results obtained by the subject students from the experimental group that took part in the investigation represented a significant methodological approach that implied criterial assessment grid and the scoring guide as research instruments.

The analytical and synthetic performance of the students involved in the research could have also been identified by the analysis they performed as a synthesis, as beneficiaries of the optimization of the thinking operation process, or as members of the control classes. This method represents the path that the behaviour of the students in the experimental classes follow, after the analytical and synthetic capacities training programme aiming at transforming them into logical and didactic procedures ends, to prove the concretized cognitive autonomy. Applying this research method coincides with the re-testing moment of the research by means of which the students in the experimental group are involved in the educational programme that valorizes the dynamic algorithms for processing information, which are subordinated to the taxonomic stages of the cognitive domain as a methodological framework.

The didactic experiment represents the central research method of the study we realised. During it, an inter-subject experimental design is put into practice. This enables comparison of the behaviour changes recorded under the independent variables at the experimental group members, with the characteristic behaviour of the members of a witness group, which was not subject to the experiment. Within the pedagogical experiment, identifying the evolution of the experimental classes becomes possible by experimental intra-subject design. In this way we can perform detailed analysis of the experimental lot members' evolution, based on which we can evaluate the impact of introducing independent variables upon the values of dependent variables.

Investigation instruments used during the experimental research are: assessment of analytical and synthetic operations, assessment of analytical and synthetic thinking, progress sheet, scoring guide, criterial assessment grid, and investigation protocol.

The assessment test was chosen by us to investigate the extent to which the deep and higher level thinking are engaged by the experimental and control group members, in the stages previous to and following the experiment (the post-test stage, the re-test stage). The deep and higher level thinking engagement forms the basis for the use of analysis and synthesis forms from those established by us in the theoretical part as being relevant to the students' cognitive development. The evaluation objectives of the analytical and synthetic operations assessment test were conceived by relating directly to the Romanian Language and Literature and Civic Education syllabi that direct the educational process during the fundamental acquisitions stage. The evaluation objectives of the analytical and synthetic thinking are formulated by correlation with the specific objects of the cognitive training educational programme, which was constituted in the independent variable introduced in the research.

The progress sheet was chosen to be used as a research instrument at the same time with the experiment in the experimental classes and it implied, in this stage, the involved teachers' direct participation. The educators' contribution was concretized in the operation of completing the assessment of students' independence in the activity performed during the period when the independent variable was introduced in the experiment. The students' progress during the formative programme could be intensified through the specific feedback the teachers who monitored the quality of students' results offered by means of the progress sheet. Through synthesis of data offered in the progress sheet by those who completed them, we cumulate significant items regarding the formative intervention programme initiated by us concerning the cognitive acquisition- analysis and synthesis- and concerning the independence achieved in using the logical and didactic procedures of analysis and synthesis. In fact, we refer to the independence achieved in the manifestation of the following specific behaviour: defining terms, performing the operations specific to the reference concepts development, classification of ideas, objects and sentences is a personal manner, formulating comparisons, building the work and action hypotheses, personal analyze of the value of sentences, forming the questions, and identifying the behaviour mistakes.

The criterial assessment grid and the scoring guides are implemented in the activity of the experimental lot students as investigation instruments, aiming at offering them a better understanding of what is assessed, of the grading criteria used, of the standards of results that should be reached. The investigations assessments grids are used to describe the performance for each criterion or feature, at different levels, by means of descriptors. The four quality levels of competence we conceived are arranged in a decreasing order.

The scoring guides used to assess the effects of the learning activities performed by the students in the experimental group, include indicators that designate learning experiences the students went through during the didactic approach. By indicating the presence of the student's behaviour mentioned in the guide, it is shaped, at the end of each didactic action that corresponds to a learning unit, the proportion of specific manifestations that designate deep and higher level thinking by means of engaging analytical and synthetic procedures.

The criterial assessment grid is used for the evaluation of the ten products of the activity of students who are part of the experimental class during the research. The components of this investigation instrument are represented by analytical and synthetic indicators that, for realizing the products, are harmonized in specific formulas, according to the cognitive training model conceived by us. In fact, the indicators that represent criteria in the assessment grid are: discussing all aspects, explanation of the contextual aspects of the truth and the false, identifying and using the criteria, concept development.

Focus groups are taken by taking into consideration the subjects' ability to use- due to their age- analysis and synthesis as intellectual work procedures. Therefore, we started, in the course of the formative experiment, from an essential variable for the theme of our study. Based on the focus groups forming, we included in the study a number of four experimental groups (N=108) and four control groups (N=112), organized in dyads: experimental group- control group. Consequently, 220 primary school students in the development curricular cycle were involved in the research.

The criteria according to which we choose the research subjects are: level of specific performance reached by the subjects at the end of the previous learning unit, which pursued objectives similar to those followed during the formative experiment, and the results obtained by the subjects involved in the research at the initial evaluation whose basic instrument was the assessment test, used in the pre-test stage of the experiment.

During the contents sampling stage, a direction of action is shaped: adopting a decision regarding the learning activities contained in the didactic strategies that will form the experimental approach in an explicit manner, that both meet the needs of the students in the experimental lot and harmonizes with the dynamic algorithms for processing information, that are subordinated to the taxonomic stages of the cognitive domain. To follow this path, we decided to engage in the experimental approach those strategies which are based on questioning, discovery, and regarding the learning tasks, their provoking characteristic is chosen as criterion for their formulation, by this understanding their potential to determine the explicit practice of analysis and synthesis operations, in the context of frontal class organization, group work, pair work, or individual work. In the forth chapter, the categories of strategies that form the experimental approach are illustrated and the specific of learning activities within the strategies are mentioned. The students' specific behaviours, pursued by the learning task, are also put into correspondence with the working instruments used during the research. All of these represent the content sample of the performed research.

The thinking development programme designed by Matthew Lipman and entitled "Philosophy for children" is an efficient contents support in the context of the experimental research, which helps children to think by identifying strategies and subtleties of the logical thinking, learning to ask questions, to express, but also to sustain a viewpoint, to comment, and to evaluate.

The distinctive stages of the research are: the pre-test stage, the formative experiment stage, the post-test stage, and the re-test stage. All are illustrated in the forth chapter, as elements of the pedagogical design conceived and put in practice by us.

The pre-test stage is organized and created in such a way that allows establishing the statistic compatibility degree between the experimental lot and the control lot from the perspective of deep and higher level thinking engagement in solving the tasks, of the cognitive performance level, regarding the self-regulation and the control they exert upon their own mental operations, regarding thinking flexibility, analysis and synthesis promptitude and productivity. In this was we can evaluate the extent to which analysis and synthesis are engaged at the deep and higher level thinking, and also the cognitive autonomy of those who were directly or indirectly involved in the research, in the context of practising implicitly or explicitly the mental operation mentioned, within the learning process. For identifying the level of implicit involvement of analysis and synthesis that the students in the experimental and control classes can prove, the assessment test of analytical and synthetical operations is applied. To measure the ability of both the students in the experimental and control classes to put in practice the logical and didactic procedures that imply performing analytical and synthetic operations, the assessment test of analytical and synthetic thinking is used.

The actual experimental phase is equivalent with the interval of the two semesters in the school-year 2005-2006. While in the control classes the educational process takes place within the subject called "Philosophy for children", in the form of traditional teaching-learning-assessment, in the experimental classes, strategies based on an experiential learning model that facilitate students' ability in using dynamic algorithms for processing information, that are subordinated to the cognitive domain taxonomy, are introduced in the didactic approach. All sixteen learning units are included in the so-called "cognitive training programme", which is performed by the experimental lot members. By means of this educational programme, it is pursued as a main goal transforming analysis and synthesis in logical and didactic procedures known by students and, as a consequence, the students' performance is improved. The structure of the formative programme is presented in subchapter III.3 of the third chapter and the programme detailing by

mentioning the concrete learning units the students in the experimental lot studied during the experimental research, is provided in Appendix 10 of the paper. The synthesis of the cognitive programme we experimented is represented in the school syllabus of the optional subject "Philosophy for children" (Appendix 1) and by the annual planning of the same subject (Appendix 2).

The independent variables are included within the model of cognitive training programme as analysis and synthesis forms that involves deep thinking (GP) and higher level thinking (GS), by means of dynamic algorithms for processing information.

Concisely, these analytical and synthetic indicators are grouped in the following categories:

1) Algorithmic approaches that include analysis and synthesis stages in processing information at the levels of knowledge, comprehension, application:

Dynamic algorithm type 2GP-2GS made of the following analytical and synthetic indicators: elementary analysis→ analysis by means of synthesis →synthesis of confrontation→ multilateral synthesis

Dynamic algorithm type 2GP→2GP made of the following analytical and synthetic indicators: synthesis of confrontation→ processual analysis → concretization→ analytical description

Dynamic algorithm type 2GP↔2GS made of the following analytical and synthetic indicators: synthesis of confrontation→ processual synthesis

Dynamic algorithm type 2GP↔2GS made of the following analytical and synthetic indicators: processual synthesis→ analysis by means of synthesis

2) Algorithmic approaches that include analysis and synthesis stages in processing information at the levels of analysis, synthesis, evaluation

Dynamic algorithm type 2GP+1GS↔ 1GS↔ 2GS+1GP made of the following analytical and synthetic indicators: processual analysis, analytical descriptions, multilateral synthesis→ processual synthesis→ elementary analysis, processual analysis, multilateral synthesis

Dynamic algorithm type 1GS→1GS→1GS made of the following analytical and synthetic indicators: multilateral analysis→ multilateral synthesis→ multilateral synthesis

Dynamic algorithm type 1GP→1GS→1GS made of the following analytical and synthetic indicators: analysis by means of synthesis→ synthesis of confrontation→ processual synthesis

The algorithms listed above are combined with varied learning tasks that force the student to perform analysis and synthesis within the learning situations like: forming of concepts, forming of categorizing principles, comprehension, problem solving, decision, investigation, and presentation.

All four components (analytical and synthetic indicators, dynamic algorithms for processing information, learning tasks, learning situations) are connected in the design of the cognitive training programme. The mere use of the syntagm "cognitive training educational programme" designates, in this paper, this sum of components introduced in the research, and which we detailed above.

The dependent variables have been represented by: the intensity degree of the frequency of deep and higher level thinking engagement in solving the learning tasks specific to the learning situations the students went through during a didactic approach; the degree of students' independence in using the dynamic algorithms for processing information; the level of school cognitive performance.

The post-test stage of the research occurs at the beginning of the school year following the year in which the formative experiment took place. Its objective is to verify the validity of the hypotheses formulated before the development of the cognitive training programme and, also the value and the relevance of the programme itself. Comparative analyses made in this stage, based on statistic methods, refer to the effect of the activities organized, planned and put in practice from the viewpoint of the philosophy and educational practices promoted by the "Philosophy for children" programme and by the experiential learning paradigm, underlain by: appreciation of the performance level regarding the use of analytical and synthetic procedures; appreciation of the incidence upon the intellectual learning style of the training for using analytical and synthetic procedures during the acts of processing information. Thus, the differences between the results of the students in the experimental lot and those in the control lot are revealed by means of the assessment test for analytical and synthetic thinking evaluation. For revealing this aspect, the students in the two classes involved directly or indirectly in the research, write again the answers for the items in the assessment test given to the subjects in the observation stage (pre-test), before the students in the experimental lot were involvement in the formative training programme.

The assessment test for analytical and synthetic thinking is completed again during the re-test, by all the subjects involved in the research. Our option for the same assessment instrument is justified by the need to ensure the accuracy of the comparison of the data obtained during the three testing stages in the formative experiment.

For verifying the temporal stability after the experiment ended, of the independence and autonomy regarding the use of analytical and synthetic procedures, and also of the frequency of using the dynamic algorithms for processing information, which posses analytical and synthetic indicators, we resort to re-testing the subjects by means of investigation method. Applying this research method implies involving the experimental lot and control lot students in an activity that means investigating the required aspects through specific learning tasks given by the teachers who organised their learning activity during the pedagogical research. The investigations take place long time after the formative experiment, during the school-year 2008-2009. The investigation themes are opportune and adequate to the age of the students, due to the fact that they are in the fifth or sixth form at the time of investigation. For studying each theme, the students were given two weeks of school and extra-curricular activities. The students fill in investigation protocols, and the teachers monitor the course of investigations, helping the students every time the need. The general structure of training, with its specific elements, is found in Appendix 8, which contains the particularizations for the themes the students approach by means of investigation. Investigation protocols are used for recording, analysis, and statistic interpretation of data related to the level of autonomy and control in using the analytical and synthetic procedures that can be proved by the students who were included in the experimental lot and in the control lot during the pedagogical research.

Chapter V
ANALYSIS AND INTERPRETATION OF THE EXPERIMENTAL DATA

We have chosen an inter-subject experimental approach combined with intra-group quantitative and qualitative analyses, both facilitated by using suitable techniques and instruments to determine objectively the students' progress in using analytical and synthetic procedures in the learning activity.

To evaluate the extent to which learning situation organization, done by linking the tasks to the didactic procedures that mediate complex cognitive operation engagement, in a succession similar to that of the taxonomic stages of the cognitive domain, determine the occurrence of qualitatively superior results of practicing analysis and synthesis (specific hypothesis 1), we quantitatively analyzed the criterial assessment grids, the scoring guides and the progress sheet- the main investigation instruments used in intra-subject evaluation to identify the frequency of deep and higher-level thinking, and also the level of the students' independence in using the dynamic algorithms for processing information. We noticed a constant growth of these parameters during the formative intervention.

The data we obtain were also proved within the inter-subject analysis, by demonstrating, in the case of the subjects in the experimental classes, the positive effect the involvement in the educational cognitive training programme has upon the level of analytical and synthetic performance, but also upon the independence in the engagement of the dynamic algorithms for processing information (facilitators for analysis and synthesis). It was noticed that during the research we performed, the average grades obtained by the students in the control classes at the assessment tests regarding the aspects mentioned above, from the post-test and re-test stages, decrease or remain at a similar level, comparing to the pre-test moment, and the average marks of the students in the experimental group improve gradually.

This denotes the efficiency, the effectiveness of the cognitive training programme and its contribution to the cognitive performance progress.

The previous observations, based on the statistical calculations, were made by taking into consideration the results obtained at the assessment tests, were even more eloquent for confirming the educational intervention programme efficiency as in had been demonstrated in the stage previous to the research, that there weren't significant differences between the results obtained at Romanian Language and Literature and Civic Education (subjects of great importance from the viewpoint of their specific finalities, similar to those of the cognitive training programme) by the students experimental group, and the results obtained at the same subject by the students in the control classes (in the pre-test stage). It had also been demonstrated that the analytical and synthetic performance level (expressed by grades) of the students in the experimental classes is comparable from a statistical viewpoint, with the analytical and synthetic performance level (expressed by grades) of the students in the control classes.

To evaluate the extent to which students' training in using the analytical and synthetic procedures during the processing information acts determine an intellectual activity that has a positive effect at the level of performance by improving the school results of cognitive nature and at the formative level by transforming analytical and synthetic procedures in autonomous characteristic elements of an personal style of intellectual activity (specific hypothesis 1), we quantitatively analyzed the independence and autonomy regarding the use of analytical and synthetic procedures. By the intra-subject analysis approach we aimed at completing the image we created during the formative experiment stage, about the autonomy and the control in using the dynamic algorithms for processing information through applying the analytical and synthetic procedures. To this purpose, the use of investigation method proved to be truly helpful.

It could have been noticed, by means of statistical interpretation and analysis, that the students included in the experimental lot prove, after a long period of time since the formative experiment ended, autonomy in using analytical and synthetic procedures within the dynamic algorithms for processing information. Consequently, specific hypothesis 2 was confirmed.

The overall conclusion is that during the experimental approach, in the context of regarding the experiential learning model as principle of constructivist learning, of applying the dynamic algorithms for processing information subordinated to the taxonomic stages of the cognitive domain as methodological framework, of the anchor contents promoted by the "Philosophy for children" programme as a curricular basis, took place the transformation of analysis and synthesis in logical

and didactic procedures known by the students and also the improvement of their style of intellectual activity. In this way are verified the quality of the educational programme implemented in the research as an independent variable and the truth value of the research hypotheses, by means of analysing the results obtained during the formative intervention, and also by means of comparative pre-, post-, and re-test analysis.

On the basis of the quantitative analysis of the results obtained during and after the experimental approaches performed, and also on the basis of the theoretical analyses, we formulate a series of final conclusions. Their structure includes suggestions regarding the possibilities for optimising the educational programmes that can take place in a formal or an informal context, aiming at developing the students' cognitive abilities, analysis and synthesis mental operations, and par excellence, aiming at their early transformation in logical and didactic procedures subordinated to an autonomous style of intellectual activity.