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## **Research Article**

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## Experience and Proposal for the Use of the Generative Process in the Learning of Knowledge in Primary

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## Introduction

The idea that schools must fulfill the objective of teaching students to learn to think [1], that children pose challenges in obtaining knowledge and then show their skills [2] and that there is a certain healthy competition between them, has been constantly mentioned since the end of the 20th century. Unfortunately, these theses remain, for the most part, on paper, which is explained by the fact that among the 4 existing educational paradigms (informational teaching (Comemius), problematic teaching (Dewey), programmed teaching (Skiner) and developmental teaching (Vygotsky)), In Spain and almost all over the world, informative teaching continues to reign until now; The problem begins to stumble into teaching through projects only in recent years; the developer is very little known or not completely known.

Among the biggest and most insufficient things seen in the current widespread educational process, but which is still the most important, we will mention:

1) With the supposed and sought-after internalization given in an informative manner by the teacher, the externalization of what has been learned by the students is almost absent, despite the proposals on how to make it effective [3].

2) The barely explainable abuse of the tests and an almost ungraded evaluation (except only at the end of the quarter) are rather penalizing in nature and not at all stimulating.

## Goals

The appearance of this article is explained by the fact that the primary idea, in correspondence with the child's hope that they will help him learn to think and his parents, is that any primary school must be interested in seeing its main task in the development intellectual of his disciples. To achieve the stated objective, we propose that each student in the same class generates in a problematic -heuristic way the knowledge that has to be studied according to the study plans. With this technological-generative process, the internalization of knowledge will be carried out by the same student who does it, first, individually, followed by a subsequent necessary clarification in a group or with the entire class [4]. Of course, the indicated generative process is prepared by the teacher, becoming a creative subject, an engineer of a special technology (until the corresponding textbooks appear). This is the innovation that is proposed, with which the objective is set for the student to obtain the possibility of being another subject of the technological-educational process alongside the teacher and of acting in such a way that allows him to generate knowledge with its subsequent exteriorization that will be done with pleasure and ease.

## Proposal

To achieve these objectives, it is proposed to change the current vector of informative-imperative teaching, which starts from behavior inevitably going to memorizing work, for another completely opposite one: which starts from the intellectual work of the students in the class with a subsequent direct impact on their conduct. The primary objective focuses on the educational process beginning with the student's intellectual actions and operations that, with challenges and a motivated organization, safely lead to personal successes in the domain of knowledge and skills and thus influence student treatment towards the same process. study and change your behavior. In this analytical-synthetic intellectual performance, materially presented in the contrastive table/model, the task is set for students to carry out intellectual actions based on comparison and in their contrast to see the regularities, the detail or elements that support them, to make hypotheses. and go on to generalize, conclude and systematize knowledge.

## Part I

We describe each of the aforementioned intellectual actions that are developed on the problem -heuristic model that we propose based on specific material from the Spanish language and arithmetic. In this way, students generate the knowledge sought, enjoying the intellectual and reflective path that allows them to observe and experience that they are competent and successful. To be more specific and highlight the obvious difference between the process that is currently most widely used in schools in contrast to the proposed heuristic-generative educational process, we present the comparative table between traditional informative-imperative teaching and developmental teaching. problematic heuristic (Figure 1).



As we see, traditional teaching is informative and at the same time it is imperative, since the student's role is reduced to reproducing and memorizing what is given in the textbook. With this process, teachers present, and students accumulate knowledge and develop skills in a personal way. In the ideology of the traditional educational model, the main place is occupied by the behavioral conception that sees in the student, primarily, a performer of the work dictated by the teacher, seeing the student in terms of the object of study. In the informational-imperative model there is no place for such human phenomena as creativity, independence, individuality, naturalness, etc. The behaviorist objectives introduce into the educational process the spirit of a narrow utilitarian nature and impose on the teacher an inflexible and mechanical way of actions. The ideal in this case includes exact monitoring of the prescribed standard, with which the teacher plays the role of subject, and the student is the object of the study process and in the field of knowledge they are preparing him to take the tests.

In order to innovate in teaching and change its nature from being informative-imperative to developmental and constructive (problematic -heuristic), it is essential to make the shift at a strategic level. This includes reversing the behaviorist vector of informational-imperative teaching, giving it an opposite character so that the teaching-learning process starts from the personal intellectual work of each student and then leads them to regulate their behavior. The rest of the changes will be a consequence of the innovative strategic level presented and will form the tactics of the work of both subjects of the educational process, be they students and their colleagues, such as the teacher.

Developmental teaching is based on the resolution of intellectual problems, ultimately being heuristic, and corresponds to the phenomenological model that emphasizes a personal nature of study and therefore takes into consideration the individual psychological particularities of the students, a careful and respectful treatment towards your interests and needs.

Representatives of the phenomenological model A. Maslow, A. Kombs, Ch. Rogers and others reject the idea of seeing the school as an "industrial chain in education." They highlight its humanistic aspect in teaching, since it is in greater correspondence and adaptation to the genetic evolution of the intellect of the human being, so that it helps him to discover in himself and for himself what nature had deposited in him and not to reshape it in correspondence with a certain form, thought and invented previously and especially by others and put in textbooks. Teachers and professors of the developmental, productive orientation create conditions and offer possibilities for self-cognition and support for intellectual development. This development is unique and independent in each student and corresponds to their own nature in terms of opening the way to generate and create knowledge for themselves, realizing their natural potentialities. Supporters of this model defend the right of the individual to develop their personality in the teaching-study-learning process. The student thus becomes another subject of the educational process in which he develops his universal intellectual actions, both general and special.

Problem -heuristic teaching are very varied:

1) An indicative presentation of the material to be able to generate it visually.

2) A heuristic interlocution to consolidate the material in questions and answers.

3) An analysis of practical situations with their discursive exposition.

4) A dispute, colloquiums, exchange of roles, a problemsolving contest, a variety of interpretation contests.

All the procedures mentioned must have a problematic nature above all in their content. In the aforementioned forms of classes, students concentrate their attention on the main problems of the subject being studied through practical and prospective methods, but they do so in their own individual way and volume. However, a class based on generative teaching must be problematic (for thinking) [5]) and also heuristic (with flash) [6] due to its methodological and technological compliance that repeats the reflective psychological process exhaustively completed. Thus, the serious problems of science, the guiding ideas and the methods of action are practiced through the class reproducing the logic of scientific research or scientific-practical search, with the moments full of controversy and discussions.

## Part II

So that it has become evident with the application of developmental (Vygotsky) and constructive (Piaget) teaching, it is proposed to develop and describe the indicated corresponding educational technology that is based on creativity (whether of the student or the teacher) and that has as its main objective the formation of a creative personality. Such training is resolved not only in the course of problem -heuristic teaching, but by the direct influence of a creative teacher, of the creative treatment of the material between the subjects of the educational process, of competitions and games, of fantasy and improvisation, in the which the problem is expressed with relaxation, imagination and intuition, with an immersion in the world of new relationships of the human being with other factors. It is obvious that the proposals presented must be reflected in textbooks, since there is scope for this.

Problem -heuristic teaching develops the creative activity and cognitive independence of students in each classroom, involves them in continuous investigative action, forms a cognitive and investigative interest along with the qualities of exploration and prospecting skills. In addition, it opens the possibilities of creative collaboration between students and teachers, favoring deep and solid learning of the study material and the ways that allow it to be processed.

Problem -heuristic teaching corresponds to social demand, to the nature of the discovery of scientific knowledge that students make in their genetic evolution and to the practical-transformative management of human performance, to the fundamental particularities of development. personal and developmental and constructive teaching, as its educational and pedagogical revelation.

Now we can move on to present in more detail the innovative experience that sustains the student in his internal motivation with the desire to demonstrate his competence.



In its entirety, the educational technological process is a psych didactic system that works in the teaching-learning of all subjects (mathematics, natural sciences, social sciences, mother tongue and foreign language). The methodological moments in the study of each subject have their own particularities, but as a whole the system has the following composition (Figure 2):

As we see, the system is made up of 7 subsystems with psychological comfort as the basis of the entire educational technological process and creates a comfortable personal background for both the student and the teacher:

## **Problem -heuristic dialogue**

It is an innovation in the collaborative treatment between the teacher and the students based on the Socratic method of heuristic interlocution to realize an insight. Problematic -heuristic dialogue with a guiding basis is the teaching-learning process organized in such a way that it allows each student to discover knowledge and generate it with their own voluntary intellectual performance in the class. This is the first step to internalize knowledge.

### **Supporting notes**

It includes the introduction of programmed topics in large blocks, focused on supporting signs, as the basis for intensifying the study process. The notes Supporting elements are samples that demonstrate learning and ensure the accessible nature of the tasks and the student's confidence in doing them along with other procedures that take into consideration the psychological particularities of student thinking. The subsequent self-analysis in the written reproduction of the supporting notes and then in the explanation aloud to oneself and then in the classroom of the learned material plays the main role in the process dedicated to internalizing the planned knowledge. Here you can clearly see the step aimed at externalizing the study material.

## Perspective of propaedeutic advance

It is a qualitatively innovative approach in advanced structuring and programmed planning of study material. The perspective of propaedeutic advance [7] It involves the introduction of portions of complicated material long before the children are to finally assimilate it according to the schedule. This offers students the possibility of working without haste, according to their strengths and possibilities, and for as long as is necessary so that they can progress safely. The sustainable moment for the student in this process is revealed in the commented management of learning (the student comments on what he is doing in practice, relying on all universal study actions, whether regulative, discursive, cognitive, and logical).

## **Mutual management School**

Refers to the social relationships between the subjects of the entire educational process. It is the organization of a management, mutual delegation of the study process between the teacher and student and, first of all, between the students themselves on the principles of collaborative pedagogy together with the participation of classmates in correction, evaluation and grading, including parents in monitoring the achievements of their children.

### Review

It involves comprehensive review with multiple and varied repetition of the material studied at the reproductive, productive, and creative levels.

### Homework to do in available time

It includes an arsenal of exercises and activities that students do as they advance in the educational process, fulfilling them as they wish, with the possibility of choosing the turn and time.

#### **Evaluation and qualification**

It includes continuous monitoring and correction of student achievements based on constant reverse contact (feedback) and the principle of open propaedeutic perspectives. The evaluation is done by the teacher and the grade is given by classmates.

It should be mentioned that in all stages, steps and moments of the innovative educational technological process dedicated to supporting students there are no small things: each procedure, even the simplest at first glance, is well thought out and constructed in such a way that the student obtains success. All of the teacher's work is intended to ensure that the desire to learn is not extinguished by the first difficulties and that the student does not lose the desire to study (the path from ignorance to knowledge requires a lot of work), but rather that it becomes his will to learn. overcome difficulties, that from their inability they move to a stable motivation to learn the new. In this way, success in studying and knowing how to become aware of your own skills and abilities that you are doing different problems and activities with quality, lead to the student forming a sense of being competent. It is a new aspect of self-awareness that, together with reflective thinking, allows us to consider them as a new and central training for any student. The sense of being competent is directly and closely related to the formation of the competencies outlined in the Common European Framework.

Among the 7 subsystems, with psychological comfort as 8th, we must highlight the problematic -heuristic dialogue as the most relevant and innovative in its organization, which is why we mainly dedicate the entire following section to it.

#### Part III

With some examples that we illustrate below, we will see how a problematic -heuristic dialogue that was called incentive [8] develops. Let us indicate that this dialogue contains only problematic questions that encourage students to first look for regularity and the elements that demonstrate it on their own.

Topic: Gender of noun (noun).

In the current Spanish language textbooks on the topic that we address to 3rd grade students (9 years old), a rule appears with the following statement:

"Names can be feminine or masculine. When the names do not designate a male or a female, the articles the and the They help us determine their gender.

The feminine is formed by changing the -o of the masculine

with -a: teacher > teacher, adding -a: painter > painter, changing the entire word: bull - cow" (illustrated with two cow snouts).

As we can see, the rule is given in the book in the form of a plain text with an immediate follow-up of the material. The text is prepared in advance by the authors of the textbook and the students have no choice but to learn it relying on their attention and short-term memory to be able to maintain knowledge at least for the time of taking a test.

## Proposal to Present the Material in a Problematic-Heuristic Way

Next, we are going to show the possible variant of presenting the material in a problematic -heuristic way, offered as an intellectual task that is essentially based on thinking (which in his time a scientist had done generalizing this grammatical phenomenon) with which the main objective of developing the culture of thinking in students is achieved (Tables 1-4).

Table 1: Offering the guiding base.

Воу	Girl	
Brother	Sister	
Cousin	Cousin	
Uncle	Aunt	
Grandfather	Grandmother	

Task: Look at the following table and comment on the differences:

#### Table 2: Problematic dialogue -heuristic:

Teacher's questions	Student responses	
1) How many columns do we have on the board?	Two.	
2) How are the words in the two columns different?	In what are men and women.	
3) What letter do the words in the first column end with?	With the <-o>.	
4) What letter do the words in the second column end with?	With the <-a>.	
5) So, what can you say about the words in the first column?	Those for men end with <-o>.	
6) And what can you say about the words in the second column?	Those for women end with <-a>.	
7) Which of the columns is masculine and which is feminine?	The first is masculine, the second is feminine.	
8) So, what do masculine words and feminine words end with?	Masculine words end with the letter <-o>. Feminine words end with the letter <-a>.	
9) In general, what have we learned today?	What letters do masculine and feminine words end with.	

 Table 3: Offering the guiding base (one more of the same kind).

Book	Table
Hand	House
Washing machine	Phone
Kitchen	Shoe

Task: Look at the following table. (The teacher offers a guiding basis so that students see that not only people, but objects can be masculine and feminine).

Table 4: Problematic dialogue -heuristic:

Teacher's questions	Student responses	
1) What can you say about the names in this table? 2) What is the difference between this table and the one above? (blue and red).	They end the same as in the first table: masculine names end with the letter <-o> and feminine names end with the letter <-a>.	
3) Look closely, are these names people?	No.	
4) And what are they?	They are things.	
5) What gender are the words in the first column?	Male gender.	
6) What gender are the words in the second column?	Female gender.	
7) So, what have we learned today?	That not only the words of people can be masculine and feminine, but those of objects too.	

In the problematic -heuristic dialogue, it is very evident how the term male gender and female gender is introduced in a subtle way and is not suddenly planted on the student, as in the text of the current book.

## We are Going to Present What we Learned in a Scheme/Model

With this stage the teacher has the possibility of developing another dialogue to represent the rule by focusing the students' attention on the colors, shapes and signs socially accepted or chosen by the students in the classroom to distinguish the places for men and for men. women. The importance of observation during the study [9] has been mentioned with proposals on how to read the image [10]. The importance of this constructed model is irrevocable since in the next class it will be the basis of the presentation, firstly, visually, and subsequently, discursively of concrete knowledge (Figure 3) (Tables 5,6).



Figure 3:

 Table 5: Offering the guiding base.

The boy	The girl	
Brother	Sister	
The cousin	The cousin	
The uncle	The aunt	
Grandpa	Granma	
The book	The table	
The hair	The house	
The phone	The washing machine	
The shoe	The kitchen	

This time the students' attention will be focused on the corresponding grammatical articles.

Table 6: Problematic dialogue - incentive heuristic.

Teacher's questions	Student responses	
1) What can we say about this table and the two previous ones?	This table contains the words from the previous two, but they appear and the.	
2) What is the difference between the columns?	In which the 1st column contains the masculine names with the and the 2nd column contains the feminine names with the.	
3) Can we call the word label and the word the?	Yeah.	
4) Where have you seen the labels?	In new clothes, in toys.	
5) What can you say about the word labels that we distinguish?	el is added and for the 2nd, the word la.	
6) Can we put the female labels in the first column? What will they sound like?	No, we cannot. They will sound ridiculous.	
7) Can we put the male labels in the second column? What will they sound like?	No, we cannot. They will sound bad.	
8) So, what have we learned today?	That the word the marks the masculine names, and the word the, the feminine ones.	

# Developing the Support Model to Visualize Knowledge

We are going to represent what we learned in a visual model. There are two variants to continue modifying the model: a) the model is presented suddenly, or b) the teacher makes a dialogue in which he asks with what figures and colors he intends to present the masculine and feminine with their corresponding markers and endings (Figure 4).



The question is: What two markers of different colors tell us that the words are feminine and masculine? The students respond: The color yellow marks the masculine gender and the pink color marks the feminine gender. The teacher suggests that each student give two examples. Next, the teacher proposes that they make their interpretation of a model a little different from the current one, which has the following form (Figure 5):



The students immediately see the difference between these two models and highlight that the masculine word accompanied by the marker <el> has a gap, which they guess does not end with a vowel, and the feminine word is given a <-a> and they continue with the example given by the teacher: doctor – doctor … (inspector – inspector, teacher – teacher), etc.

We will draw conclusions. The students see that the vowel ending is missing in the first line of the visualized model, so they deduce that the name ends with a consonant and thus generalize the knowledge, arriving at the desired rule.

The following table will have contrast between names ending with consonants. To draw more attention to this type of words and with the mnemonic objective, we are going to present them in a somewhat different framework from other supportive guiding bases (Figure 6).



As you can see, the comparison table contains 4 groups of words ending with a certain consonant. The teacher develops the problem -heuristic dialogue by encouraging students to highlight the consonants and see that words can be of different genders but ending with the same consonants. Finally, the support model is made with an appearance similar to this (Figure 7):



The students will conclude that their gender will be differentiated only by the labels and that they can now be named articles. Naming articles with grammatical adjectives is not the time. Out of respect for students at that age, it is not allowed to hinder the initial intellectual process with abundant linguistic terminology. It will be done gradually and according to the intellectual development of different psychological levels of the students.

If we make small conclusions, we will see that with the generative educational technological process that is proposed, the grammatical material is offered in an inductive way, goes through deductions, and ends with its translations through the signs of the model that is visualized and thus materializes the knowledge in reduced form. This form is already an authentic codification of the material [11].

Next, we present how the possible problematic - suggestive heuristic dialogue continues [8]. Let us remember that in its development the teacher introduces some tasks/activities or

## Problematic dialogue - suggestive heuristic

Table 7: problematic dialogue - suggestive heuristic.

additional clarifying questions that suggest to the students the path of how to find regularity and the elements that demonstrate it.

#### Issue

Distinction between even and odd numbers.

## Offering the guiding base

The teacher draws a vertical line on the board and suggests that students do the following practical actions:

1. Write the figures one by one up to ten around the line (red in our case). (If you do it in the PD, then try to distinguish the odd and even figures with a different color).

2. Now we all take out the counting sticks and let's work with them.

3. With sticks we are going to represent the figures of each line in 2 columns.

Teacher's questions	Student responses	
4. Can we separate the number 1 into equal parts?	No.	
5. Can we separate the number 2 into equal parts?	Yeah.	
6. What parts do we get?	1 and 1.	
7. Can we separate the number 3 into equal parts?	No.	
8. Can we separate the number 4 into equal parts?	Yeah.	
9. What parts do we get?	2 and 2.	
10. Continue with the sticks separating the figures that follow. What do we get?	Separate the numbers in half remaining. 3+3; 4+4, 5+5	

(Table 7) The students see that they can separate only the even numbers into equal parts, so the teacher moves on from suggestive dialogue to doing so with incentive questions so that the children see the difference between the numbers and come to conclude the regularity.

## Developing the support model to visualize knowledge

Now we are all going to make a model that will help you

## learn the difference between even and odd numbers.

The children, by desire or by turn, go to the board and visualize, materializing what was said and done on the figures one by one. The teacher along the way can encourage each student to propose the color or the way to represent the separation into equal parts (Figure 8).

_			1
	1	2	<b>2</b> = 1+1
	3	4	4 = 2+2
	5	6	6 = 3+3
	7	8	<b>8</b> = 4+4
	9	10	10 = 5+5

Figure 8:

With the visual model that the students have been able to generate based on the teacher's questions, the objectives of the class are achieved, supported by the generation and discovery of the necessary knowledge in each programming topic. We can present all the topics of the study material in language/language classes in a generative-visual way.

The example shows that each student in their performance starts from a job, we repeat intellectually and develop their thinking. In this way, the student body obtains the possibility of considering the intellectual challenges, the attitudinal purposes and the cognitive background that led them to acquire successes and make each class interesting, captivating, and productive.

Let us present the example of a problematic -heuristic dialogue with a turn of arithmetic actions, highlighting the parentheses in a more summary manner, as we will do below, presenting the topics addressed in this chapter.

Fragment of the class session in the 2nd on the topic "Turn of mathematical actions" (Table 8) (Figure 9):

	Analysis	Teacher	Students	
	Presentation of the first fact	- Children, let's do the calculations of the line: 8 – 3 + 4 =?	They calculate.	
		- What number have you obtained?	9	
		- Now let's change the order. First, we do the add-	They calculate.	
	Presentation of the second	ing action. How many are 3 + 4?	7	
	fact (to make mistake)	- What figure do we get if we subtract 7 from 8?	1	
	Incentive to raise awareness of the problem.	Write on the board: 8-3+4=9 8-3+4=1 - What did you think first?	We thought the answer was the same! (Problem situation.)	
problem	Incentive to the problem.	- Do you realize the difference?	- Yeah.	
		- What do we really have?	- The result is different!	
		- What question arises?	How do you know which action to do first? (Awareness of contradiction ).	
	Incentive to raise awareness of the problem	What surprises you now? Write: 8 – (3 + 4) = 1	- That the parentheses appear.	
	Conclusion	- What interesting thing can you say?	- The first thing we have to do is the action in paren- theses.	
		- Very good. So: What action has to be taken first? (Ask).	- The one in parentheses.	
	Issue	What topic do we study today? Write the topic on the board.	- Turn of mathematical actions.	

#### Table 8:

Problem -heuristic dialogues, both incentive and suggestive, mostly serve for learning all kinds of rules and regularities, which refers, first of all, to such subjects as language and mathematics. These disciplines, as is known, are most "hated" among other subjects. We present the variations of both dialogues in the section below. The examples proposed in that section offer the possibility of observing their difference from the incentive and suggestive dialogues seen previously. And finally, intellectual work organized and managed in a problematically heuristic way is closely approaching the mode of study through games, sometimes also declared as an innovation.

## Conclusions

Now, a somewhat generalized classification of the procedures that generate knowledge can be presented as follows (Table 9).



Figure 9:

Table 9: Classification of teaching procedures.

Procedures	Imperatives	Problematic dialogues		
Of the problem statement	Theme announcement	Dialogue that encourages from problematic situation	Dialogue that suggests the topic	Information on the topic in a motivat- ing way
Of the search for the solution	Presentation of knowl- edge	Dialogue that encourages making and correcting hypotheses	Dialogue that suggests from the problem	Suggestive dialogue without the problem

We will draw some conclusions. The constructive examples of incentive and suggestive dialogues based on intellectual creation allow us to highlight the contrast between the traditional informativeimperative teaching mode and the specific generative educational technological process that is proposed. Unlike the introduction to knowledge through problem -heuristic dialogue, the traditional informative-imperative type understands that knowledge given in the form of rules (be it language or mathematics) is learned in a reproductive way based on mechanical or literal memorization. In the classroom traditionally organized in an informative manner, the teacher announces the topic in his presentation, which does nothing to help students develop any cognitive interest. The search for the solution in a traditional class is narrowly reduced to the teacher's exposition of secluded knowledge, that is, to an exposition of the material that does not guarantee a good understanding of the knowledge by a considerable number of students [12-16].

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## **Conflict of Interest**

No conflict of interest.

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