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From the Hidden Protest of Students towards Problem-Based Learning

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Abstract: This paper presents protests from academically successful students who privately conveyed to the researchers their feelings of personal discontent with schools. The criterion to select this "sample" was that these students, dissatisfied with school but having good marks, would reveal what others, academically less successful, could not express, by not knowing the syllabus as well as those students. However, their complaints are followed by suggestions of changes to be analyzed in this study. Our questions focused especially on the tenth grade, as this grade starts the three-year-cycle preceding university. We attempt to contribute to the issue of teacher education, by focusing on the stream of participative research in educational institutions, conducted by external researchers in cooperation with the institution's stakeholders, students, and teachers in this study. The data analyzed for this paper came from in-depth interviews conducted, in a non-directive way, with students and their teachers. From the proposals of the students and the comments from teachers, we conclude it is crucial to substantially reduce the predominant teacher-centered methodology of verbal presentation by engaging in students' activities, including the model of problem-based learning or alike in opposition, in order to rote memorization activities.

Keywords: criticism from students; learning strategies; teachers' education; participative research; problem-based learning

> "The essentials of method are identical with essentials of reflection. They are first that the pupil has a genuine situation of experience—that there be a continuous activity in which he is interested in his own sake". [1] (p. 163)

1. Participative Research with Students

Although constructivist theories, proposing a linkage between students' conceptions and scientific concepts, are well accepted in educational literature, the current educational research generally tends to focus on teachers' stories and propositions, and forgets those of the learners, the main subjects of schools. Therefore, the participation of learners in educational studies seems essential if we want to give "meaning to the praxis" in the schools, towards a democratic society, according to Fals-Borda's proposal, where both experts and research subjects are regarded as "thinking-feeling persons" [2] (p. 30). The research on learning strategies, with students' and teachers' participation, presented in this paper, is, therefore, participative (or participatory) research, in Fals-Borda's terms.

Our key question is as folows: what do students of typical schools think about their schooling? Our research was conducted in a public school receiving eight hundred students from the seventh to the twelfth grade, located in a middle-class environment. Our objective was to listen to pupils who were dissatisfied with school, but who had good marks; this sort of "success" would be a guarantee of quality in our inquiry, as these students are well versed in the syllabus. Our hypothesis is that these

students' criticism should provide proposals on an innovative school. Our questions focused especially on the tenth grade, as this is the start of the three-year-cycle preceding university. At the time of our inquiry, students were already attending the eleventh or twelfth grades, so they could better reflect on the preceding grade. But this study depends on one fundamental condition for the relevance of its findings, namely: to have adequate data to present evidence, in Yin's terms, "with sufficient clarity to allow the reader to judge independently your interpretation of the data" [3] (p. 388). Briefly, those findings in a given school can constitute cases studies, as Yin points out: "Compared to other methods, the strength of the case study method is its ability to examine, "in-depth", cases within its "real-life" context" [3] (p. 380). The data analyzed for this article include audiotapes and transcripts of in-depth interviews conducted in a non-directive way, that is, supported by neutral open-ended questions, although followed by other questions that aimed to clarify some prior answers. The interviews were recorded and transcribed. The data analyses were based on the content analysis proposed by Bardin [4], leading to categories of information, composed by verbal or contextual elements.

Our research brings together many current studies reporting young people's indiscipline and disenchantment with schools, phenomena associated with lecture-style and verbal ways of teaching, prevalent at schools [5–7]. We can postulate, from these studies and from common observation, that boredom is an important cause of poor performance and dropout in schools. Therefore, teaching absolutely needs to change. Still, the question remains, can schools organize activities that arouse the interest and participation of young people? It seems crucial to shift from that verbal methodology, prevalent in our schools, towards strategies based on students' activities, as postulated by Fabre, in the wake of Dewey, "it is by doing that we learn" [8] (p. 98). This means that it is important to focus on problem-oriented situations in opposition to emphasizing form over understanding, as physicist Feynman [9] well expressed on the wall of his office, "what I cannot create I do not understand".

Frequent problem-oriented situations in classroom would surely influence the mood of classes, even when connected with more traditional tasks. We are thinking of motivation by curiosity, following Berlyne's concept of "epistemic curiosity", adopted by Fleming and Levie [10], "when epistemic curiosity is aroused, a person is motivated to seek more information to resolve incongruity" (p. 3). What is at stake is the concept of "problem situations", where students can do more than to receive information, being called upon to build their knowledge in a demanding way. Accordingly, Fabre points out [8] (1999) in the wake of Vygotsky,

> The student should be able to intervene in problem situations, imagine the way he needs to a solution (...) the problem must remain in the zone of proximal development of the student, neither too close nor too far from what they already know (...); the knowledge of the students is usually insufficient to immediately solve the problem. This reflects the characteristics of a real problem. (p. 90)

2. The Demand for Enough Time for Students' Own Reflection/Discovery

We were really surprised during an interview with a physics teacher. We were focusing on the complex relationship between the specific terminology of subject matters and students' colloquial language. Suddenly, a 16-year-old girl covertly asked to talk to us. We could not guess that this unexpected encounter with Mary (her pseudonym) would make us suspend our study on teachers' conceptions and direct our inquiries along a different path.

The physics teacher, interviewed just earlier, remained in the room. We guessed she, too, was interested in listening to Mary's proposals. We also guessed that Mary was disguising her criticism about her physics classes, as, in her dialogue with us, she mentioned her brother's physics teacher (instead of mentioning her own discreetly present in the room). Mary, in her distinct phrasing, proposed a different way of learning physics in opposition to that set forth by "her brother's teacher", who insisted on "proposing formulas". Here are her words:

> It is necessary to understand the global situation, to compare it with what happens in similar situations. When my brother's teacher presents a problem and immediately gives the formulas to the class, he steals (sic) everything from him. That teacher blocks my brother's attempt to find a solution by himself.

She underlined an essential factor to success in physics, namely: "the capacity to engage in dialogue with a given subject", which "allows us to establish relationships between the subject matters we are studying and new situations". For her, that capacity was not being developed in her brother's classes, or, as we can guess, in her own.

We may describe this "dialogue" as the capacity to reason in "personal language" or in an "inner dialogue" (as Vygotsky [11] puts it), with the situations presented by the teachers. When she briefly concludes that these teachers "steal everything" from learners, she condemns the presentation of contents and formulas without previous time for students to reflect/discover by their own means. In its conciseness, the last statement ("to steal everything" from students) takes us back to Dewey's proposition, in epigraph, of a "continuous activity", in which a student "is interested for his own sake". It takes us, too, to the claims of "narrative learning" about an "interior conversation", whereby a person defines his/her personal thoughts in relation with his/her place in the world [12]. Furthermore, it takes us to the wide concept of "meaningful verbal learning", developed by Ausubel [13], that is, the importance of teaching students meaningful relationships among verbal ideas and information, in order to anchor new knowledge to the learner's prior knowledge.

Moreover, from a wider perspective, Mary concludes that this interior dialogue with problematic situations removes the fear of the "big beasts", thus evoking Mathematics and Physics as subject matters that usually terrify students. In short, Mary is unconsciously assuming the already quoted problem-based-learning strategies derived from Dewey. We will come back to this issue below. After our interview with Mary, we asked other physics teachers to refer us students who had good marks but looked dissatisfied (the two criteria already presented). In some way, as we said above, these students would express what the others, academically less successful, could not say, because they did not know the syllabus as well.

Four more students were pointed out by them—three boys, Berto, Ron, Tony and a girl, Carol (all pseudonyms). We tried to involve these youngsters in the goals of our "participative research", by telling them we were researching new schooling procedures, and, therefore, their criticism would be a good source of information to approach innovative schooling procedures. Thinking of Mary's reflection on the relationship between "inner" dialogue and subject matters, we decided to focus especially on the problems of teaching physics and native language.

3. Students' Criticism about Formalism and Lack of Realism

Let us listen to Berto. We distinctly remember his initial resistance to talking, his silence, and his eyes looking, not at us, but at a distant point on the horizon. From some of his short hesitant first words, we understood that he feared that we would present his criticism to his teachers. We explained to him that the students interviewed by us were good learners who could better assume their criticism for our research. We assured him of a strict confidentiality, explaining that we would present the teachers with a general report, so that they would not recognize any particular student. We underlined that our questions attempted to be neutral, that is, not suggesting any sort of answer. After our assurance of confidentiality, Berto immediately started in a sort of torrent of criticism, starting with answering our first question, the same first question to all students, namely: "What do you think about the learning process in the tenth grade?".

Our first category of analysis is formalism, coming from Mary's complains about the impossibility of a personal dialogue with subjects, as they tend to be imposed by teachers and memorized by pupils. Berto particularly pointed out the lack of realism in school subjects, which became the second category of analysis of our interviews, namely:

> Most disciplines make us wonder: what is this useful for? For example, the classes about the gravitational force were disappointing. When I opened the first pages of the textbook, I thought we were going to learn something about astronomy, in which the gravitational force is used. But we did all these formulas on the blackboard and nothing about real facts. Only about very abstract problems, very unrealistic.

In a more general view, he mentions the frequency of propositions like "imagine that the air friction does not exist and alike." He asked, "If this is not as reality is, how does it suit me?", and he would return to this issue, "Teachers say that there are complicated things we will study at university. But what upsets me is having a lot of variables which are neglected. We should spend, at least, a part of the time with these variables to have some idea of them". He illustrates, using a large bridge, close to his city, "Our Physics teacher treats forces in an abstract way, but he should teach us what forces are at work in that bridge, so that we may understand its components. In fact, when asked by us about these situations, teachers argue that those topics are not included in the syllabus". He concluded that "things are nice in the classroom, but they serve no purpose". Or, in other words, "when we face a real problem, we will not know how to solve it".

Berto became an enthusiastic participant in our research, fully justifying its designation of "participative research", by bringing to us, in three subsequent interviews, tests and other documents on the different subjects relating to his criticism. We could understand that he and the other learners do not dare to express their views to their teachers. The reason—they fear losing their "halo" of good students. They are, then, "hidden protesters", as assumed by the title of this paper. Another boy, Ron, expressed a position quite similar to Berto's about teaching methods confined to the classroom, with plenty of exercises done in the classroom space, which bear no link to the real world, "I do not know whether it is useful to study so many movements of an object in different positions only inside classroom, on the table, on the wall, on the carpet, in the small space of classroom".

Carol would present a complementary point of view, "We will be interested in subject matters if we do observation, and if we bring our doubts to class". As she sees it, "studying physics at school is only doing arithmetic operations, memorizing formulas, without knowing why they are so". To her, teachers lead the classes solely through their own point of view, "We cannot say anything at all about how to teach the class. Never . . . The teacher is the teacher, we are the pupils, he presents the contents, we come to the classroom, listen to his speech, we get out, and we'll come in once more to hear him". She added, ironically: "And usually when we ask questions, they say that, after finishing what they are presenting, they will answer our questions at the end of class. But when that moment comes . . . everyone moves, making noise, everyone decides to go out into the courtyard".

Carol laughed, ironically, on evoking her way of learning, as follows:

> As I cannot submit my doubts to teachers, I don't pay attention to what teachers say in the classroom. I study by the textbooks. But I do not read the pages on theory. On a lot of pages of theory, I read the first formula, I do not read the following pages, and I also read the last formula. So, I memorize these two formulas or write them in my calculator. And, in the tests, after looking at the problems, I choose in my calculator the formulas that I can link with the variables presented in the problems. Then, I do some calculations, if necessary, and I write some sentences that I imagine can probably have some relationship with the situation. So, I do not understand anything, but I get good marks . . .

4. From an Existential Fracture towards a Motivated Curiosity for Science and a Happy School

We have been presenting students' criticism. From now on, we will focus on their explicit or implicit proposals towards a better school. We recall that Mary, the first student interviewed, spurred this inquiry with her dissatisfaction with her school. As stated above, Mary, in her distinct discourse, proposed an essential factor in learning physics, which is transferable to other subjects, as follows: "the capacity to engage in dialogue with a given subject matter", which "allows us to establish

relationships between the subjects we studied and new situations". We remember that we called this element "a capacity for reasoning in personal language" or, as Vygotsky put it, "inner dialogue" [11].

We mentioned carol stating that school knowledge is doing learning formulas and words by heart and doing some arithmetic counts, without knowing what they mean. To her, teachers lead the classes solely through their own point of view. Berto, for his part, also criticized a general tendency towards "technical words" in all classes. Briefly, in physics, formalism was criticized by different students regarding many academic terms, for example, "entropy" or "thermodynamics". In fact, "entropy" arose several times in the students' discourse as a difficult, but fascinating word. We found out that it was a frequent word for teachers, as well. We could not get a clear definition of it from the teachers, saying that it was a difficult concept to describe. We could approach its meaning in one book published by a professor of teacher education on physics. There, "entropy" is compared with "energy", as the origin of "energy" is the Greek word energeia, meaning "in-work", while the origin of "entropy" is entropia, meaning "in-transformation". Let us add that entropy is related to the second law of thermodynamics, a law proposing that, if energy maintains its quantity in a given system (first law), there is, nevertheless, a process of "degeneration" of the energy in this system (second law). But there is usually a weak understanding of the concepts of force, speed, and, therefore, energy, and consequently, of the concept of entropy. So, it is a difficult concept that needs to be well described.

In the discourse of the students, there is a clear demand for a necessary reflection on colloquial language about scientific issues in order to lead students, in a didactic transition, to specific terminology. In the French literature, this necessary pedagogic transition from colloquial language to the specific terms of science is called "mediation" [8]. The emblematic critical statement of a tendency to privilege strict formalism comes from Ron, "I apply rules and specific words in the school activities but if anyone asks me what they actually mean, I cannot say anything". Accordingly, Lemke, a physics education scholar [14], recommends that the "mystique" of science and its stylistic norms can be suspended often, in science classes, by preferring colloquial language, "students are three or four times as likely to be highly attentive to 'colloquial' science talk as they would be to 'normal' talk in the classroom" (p. 137). In other words, formalism terrifies students (as Mary and Berto pointed out), or, at least, bores them. Briefly, a sensible transition from daily language to specific terms can be attractive to science learning and other subject matters.

On a general view on schooling, Berto expressed a profound duality in students' lives, "There is the life outside-school and the life inside-school, my life outside-school with my normal reasoning, and my life inside-school, hearing teachers". This duplicity or existential fracture in learners seemed common to all school subjects for the students involved in this study, and it constitutes our third category of analysis. Still, these pupils' discourse suggests, as we can infer, that they believe in "another" school. They challenge their passive role in classes, and suggest a participative way of learning, as Berto proposes, "School should have (. . .) not hostility, not alienation, not stiffness, it should lead us to know that learning is simply knowing more and therefore feeling better about ourselves. So, not thinking that learning is a way to have more money in the future but rather to be happy people".

5. The Power of Language

The youngsters participating in this research criticize the teaching of science, particularly physics. Moreover, they condemn the teaching of native language as something that does not facilitate the cohesion of school subjects, mainly because language is a way of gaining access to better thinking in every subject. Ron and Berto criticized an excessive presence in the native language classes of the "old, classic" writers, including words required to be "translated as if this was a foreign language". They added that the predominance of literary texts blocks the development of the general skills of writing and speaking necessary for daily tasks. Both demanded the inclusion of contemporary texts, literary or informative, by arguing they would develop communicative and cultural skills, necessary to school and common daily activities. Briefly, they suggest that language and science classes can have a correlated way of doing, by avoiding the traditional separate strategies. Mastering language on its

different levels stems from the "personal dialogue", proposed by Mary, is fundamental to a conscious vision of the world.

Tony deserves some space in this study, especially for his criticism of language teaching. An example of critical attitude to formalism was his comment about the canonical types of sentences (declarative, exclamatory, interrogative, and imperative) determined by the syllabus. We will never forget his ironic look after he tried to mention these notions, heard in the native language classes. Looking at the amazed expression on his face, we asked him to express what he was thinking. He hesitated, but here are his intrepid words: "Well ... I will tell you ... The guy ... who invented grammar ... did not have anything else to do". He argued that it is possible to write those types of sentence in a given actual context, without explicitly knowing their formal designations.

On a different day, Tony had another interesting reaction to the "analysis" of the following sentence: "John will go to the movies, if his son goes with him". According to traditional grammar, the teacher argued the first part of the sentence ("John will go to the movies") constituted the "main clause", and the second part ("if his son goes with him") was a "subordinate clause". But intrepidly, Tony contested that analysis, by arguing that the main clause was in fact the second one. The reason was that it involves the decision of John's son about going or not going to the movies, as John's decision, in fact, depends on that first decision. So, for him, "John will go to the movies" should not be the main clause, but the main clause should be the clause stating the condition that his son would go to the movies.

These and other critical comments made by students made us look at literature on another "grammatical" approach, which could help students to speak and write better in current terms, as opposed to the formalistic classical way. In fact, Halliday [15] declares that the study of language in schoolbooks and in classroom continues "an older image of language (...) like as a book of etiquette would give of what life is really like" (p. 206). The author proposes attention, not only to formal aspects of speech, but to its meanings, included in longer units of a given text—instead of immediate constituents. These proposals concede that Tony and other students are right in their criticism of formalism in native language teaching as well, as learning it is fundamental to thinking and writing in all subjects.

6. The Teachers' Thinking

This study proposes being participative by including cooperation with students. Yet, in a second stage, we also included that of their teachers. The following question came to our mind: did this research lead to changes in the way those teachers teach? We must mention an interesting episode. In our interviews with physics teachers, we referred to the role of personal language, as Mary proposed. When we asked whether we could be present in their weekly meeting, they accepted. This weekly meeting on Fridays at noon had been a decision taken by the physics teachers to discuss the problems encountered in classes during each week. We attended six meetings of that team of teachers. An item discussed in one of these meetings was a student's answer to a problem in a test.

This problem described a car driving along a road, with another car coming from the opposite direction. The question focused on the speed of the people inside both cars at just the moment of passing each other. The words in the test were as follows: "A person is driving a car whose speedometer indicates 60 km per hour". The task was the following: "Indicate a reference frame in relation to which that person is driving 90 km per hour". A boy wrote in his answer sheet, "A person is driving along the road and on that same road another person comes in opposition to the car". His teacher attributed zero to this answer, arguing to the group of colleagues in the meeting, that the student did not master the concept of "relative velocity". But the teacher coordinating the team made him understand that he had not explicitly asked for that concept. She added that, if this answer "was wrong in terms of language, it was promising in terms of science", although it did not achieve a quantitative result. After some hesitation, the other teacher agreed to give some points to that answer. We concluded that Mary's

proposition about a "personal language" in learning activities, presented in our report to the teachers, probably had some effect in this discussion.

We summarized the learners' criticism in a report, to present it to the teachers. It seemed pertinent to engage, especially with those teachers who, at the time, were coordinators of the group of teachers from each subject matter. We recall Berto's proposition, that forces should not be treated in an abstract way, but rather lead students to consider, for example, what forces are at work in a bridge. Here, is the reply given by one of those physics teachers: "It would be interesting to try to answer those questions. This would greatly change our way of teaching. But it would involve much work ... Moreover, teachers don't know how to do that". He admitted to a sort of "vertigo of the syllabus", inflexibly commanding the teacher's head when he is conducting a classroom. Then slowly, somewhat cynically, he added the following: "But students are accustomed to thinking: There is that guy and his usual things that we do not understand".

Besides this dramatic confession, let us stress that the problems proposed by the students can become important to their motivation. In fact, another physics teacher admitted that the question about the bridge could lead to a problem situation, where the curiosity of the learners would be stimulated in "a qualitative approach". He added that this should be done, "before entering mathematical and abstract analysis of concepts involving gravity forces, conservative forces, dissipative forces, and kinetic energy". It seems a pertinent way of thinking pedagogy. However, in our conversation with teachers, we observed a tendency towards one typical reaction, namely: "we have to cover the syllabus (...) because pupils have national examinations and those unexpected questions in the classroom obstruct our commitment to that objective." In opposition, the demand for mediation between the students' ideas and the scientific concepts, formulated by Mary, is similar to that "qualitative approach" proposed by one of the teachers. In short, this approach, albeit time-consuming, will lead students to work properly in order to cover the syllabus, and even to improve in their examinations.

We mentioned students demanding the inclusion of current texts, be they literary or informative, arguing they would thereby develop communicative and cultural skills. One of the native language teachers accepted Tony's criticism of a traditional formalistic grammar, and mentioned the "weight of scholastic thinking in teachers' traditional education", thus tending towards that "formalistic grammar". Indeed, he accepted a "functional grammar", focusing on the components of a text by their meanings and not only by their forms. He and another colleague willingly accepted the cooperation of colleagues of scientific subjects, so that students can master reception/production of texts on all subjects. However, we underline that this cooperation does not relieve science teachers of their specialized role, as argued by Lemke [14], "all subjects teach a specialized language" (p. 165) as "no English teacher is going to be able to teach students how to write a lab report". Therefore, together with the practice of current texts by native language teachers, science teachers should "introduce students to more genres of science writing and give them more practice writing science" (p. 172).

7. Towards Analytic Generalization

Let us conclude that the dialogue between the researchers and the students exemplified the scope and goals of the participative research proposed herein. The students interviewed were, to some extent, "clandestine protesters" who had to hide their criticism so as to preserve their image of being good learners. We bring Yin [3] into the discussion once more,

> One of the most common misconceptions for you to overcome is believing that case studies are to represent a formal 'sample' from some larger universe, and that generalizing from your cases depends on statistical inference (statistical generalization); instead, generalizing from case studies reflects substantive topics or issues of interest, and the making of logical inferences (analytic generalization). (p. 385)

With our case study, we hope to have contributed to other similar studies towards a free atmosphere of dialogue in other schools, so that young men and women may present their views and build their academic learning upon them.

We hope to have brought enough data to allow for readers to compare the situations described above with their own experience, and to judge the objectivity of these descriptions. We hope to have added enough reflection to convince our readers of the validity of participative research. We propose that participative research can help raise teachers' and students' critical awareness in order to re-enchant today's depressed school atmosphere, and enhance attitudes of conviviality and critical reflection. Despite recognizing the importance of observation by outside researchers, let us summarize, however, some of the advantages of participative research done by teachers in their own institution, namely: improvement of practice, through the analysis of activities—continuous learning by records of those activities, which can be reanalyzed at different times. By the way, the teachers interviewed confessed they did not have time in the classroom to listen to some of the complex questions asked by the students. But they can do that in interviews, after the classes, as a form of research, or "self-study", as Zeichner proposes [16].

8. Concluding Perspectives on Innovative Schooling

Let us remember the emblematic critical statement about a tendency towards privileging strict formalism coming from Ron, "I apply rules and specific words (...) but if anyone asks me what they actually mean, I cannot say anything". In addition, the complaint from Mary, that when a given teacher presents a problem and, at once, gives the information about it, he blocks any attempt for students to find a solution by themselves. Therefore, she proposes a fundamental skill to be practiced in schools, "the capacity to engage in dialogue with a given subject matter", which "allows us to establish relationships between the subjects we studied and new situations". It seems that a way of corresponding to these demands would be the proposals of problem-based learning (PBL), a student-centered pedagogy developed by Dewey [1], quoted in the epigraph, as a style of active learning in which students learn about subjects through the experience of solving open-ended problems. Moreover, PBL meets the general demand put forward by Ausubell [13], already quoted, about meaningful verbal learning opposed to rote memorization. The reason is that, in PBL, according to Arends [17], students

- must analyze and define the problem
- develop hypotheses and make predictions
- collect and analyze information
- conduct experiments (if appropriate)
- make inferences and draw conclusions (p. 397).

The same author adds, "the research on the model has been done mainly with students in high school and higher education" (p. 403), and "the Research Summary demonstrates an interesting and successful application of PBL in an elementary classroom" (p. 403). The teacher's role is not the traditional one, "although the role of a teacher in problem-based lessons sometimes involves presenting and explaining things to students, it more often involves serving as a guide and facilitator so that students learn to think and to solve problems on their own" (p. 399).

This description of PBL seems to respond to the demands of students against a lack of realism ("when facing a real problem, we will not know how to solve it", in Berto's words) and against school formalism, mainly in Mary's demands, about the necessary reflection and inner dialogue about problems. This inner dialogue can be complemented by peer cooperation in happy schools, as Berto suggests above. But the PBL processes or other didactic forms of discovery may lead to some resistance to innovation, particularly in lower grades or when teachers are accustomed to the lecture format. These activities may risk being time-consuming and missing some important concepts of the syllabus.

Therefore, it seems pertinent to foster some coexistence of PBL with the lecture format, by giving it a functional approach, when strategically combined, in the terms put forward by Arends [17], with different teaching models (such as cooperative learning or classroom discussion). This proposal includes obviously "direct instruction" (to promote basic skills and knowledge). Briefly, this author suggests using different models in connection with "instruction differentiation" to meet the needs of all the learners, as follows: "To meet the challenges of diversity, teachers must find ways to differentiate their instruction so that each student can learn as much as possible" (p. 476).

In other words, throughout the school year, in a dynamic class, while most students may be working with some degree of autonomy in the PBL or a similar format, a group of students struggling with basic skills or concepts, fundamental to their advancement in learning, may engage in dialogue with the teacher in direct instruction. Surely, with learning activities enhancing their curiosity, all students will gradually have access to PBL or another way of working involving discovery, as critical thinking is fundamental in the construction of a new society.

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