

Analysis of Didactic Situations: A Cross-Sectional Study between Natural Sciences, Language and Mathematics

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ABSTRACT

This paper shows the results of a research carried out within the framework of a pedagogical chair on science education for elementary school students in the city of Valledupar. One of the purposes of the research was to carry out an analysis of different situations of teaching natural sciences, which managed not only to promote these specific learnings, but also those corresponding to language and mathematics. Within this framework, a methodological device was organized to jointly analyze three didactic sequences designed by teachers who had participated in previous years in the referred subject.

The authors consider that this type of initiative could favor the conceptual understanding and motivation of future teachers towards inclusive proposals, avoiding falling into the opposition between the teaching of natural sciences and that of language and mathematics, allow us to see a worrying persistence of problems of comprehension and production of texts among graduates in general and particularly among graduates oriented to the continuation of studies in disciplines in particular disciplines associated with education. This recognition does not seem to translate into actions to promote integrated work between teachers of the different teaching languages, as is the work of teachers of all disciplines related to training in reading comprehension.

Keywords: Didactic situations, transversality, teaching, education.

1. Context and Justification of the Study

Science, languages and mathematics, disciplines that are divided a good deal of time in school, are a constituent part of scientific culture. Although mathematics, natural sciences and languages are different disciplines, all professionals and researchers must master them. Their relationship is not limited only to the use of specific languages whose knowledge is necessary for the study and research of each science, but they share common educational objectives, given that the main purpose of the teaching of mathematics, nature and language is none other than to train students in the use of the corresponding languages. The basic curriculum of primary education insists, overturns and prioritizes attention on languages and mathematics, as well as establishes the opening of a considerable incorporation of concepts from physics and natural sciences throughout the six years (Perla, 2021). There is no doubt, therefore, about the importance given to these areas within the educational panorama of the country and the notion that there must be coordination and collaboration between the areas taught in the curriculum when planning and developing learning situations, techniques and processes that integrate the educational process is raised in the document. internalization of our immediate environment, understanding of phenomena, facts and products of our own actions.

2. Theoretical Framework

It is necessary to pay attention to the complexity of the didactic intervention, since each didactic situation includes a whole sequence of activities where teachers and students must be involved. Here we try to describe and compare teaching situations in three curricular areas in order to explore and try to understand the cognitive practices that are carried out around them. Underlying the proposed research is the purpose of identifying potential teaching actions that would contribute to reducing the specific learning problems that students present in the transition from basic to secondary education in different educational establishments. We can define, in this perspective, the situation as a moment in training or problem-solving, which occurs in "a particular frame of reference" (Mesa & Morales).

Every school didactic situation has a double status: it is pedagogical because it is situated in a school setting and obeys educational intentions; and didactic because it is understood as a form of teaching that involves an

intentional activity mediated by a system of gestures of which not all are purely intellectual. These mediations are not only semiotic or symbolic, but also of another order, for example, gestural. Thus, a gesture or a touch denotes that the "teacher resorts to the non-symbolic, it is purely and simply 'expression': he needs the gestural praise of the class to be calm".

2.1. Didactics of Natural Sciences

One of the outstanding notes of the level, from the point of view of general training, in the consolidation of own knowledge is the appearance of the Natural Sciences, the result of the didactic conjunction of Natural Sciences, corresponding to the training field called in that way, which constitutes an area of disciplinary knowledge that studies nature and aims to train children as future critical citizens capable of building alternatives of a better quality of life for human society.

This area of training is of special interest, since among the priority aspects of the Natural Sciences is the understanding and explanation of the natural processes and phenomena that enrich the cultural heritage of science and technology and contribute to the personalization of the scientific attitude of propensity to questioning, to argumentative activity, to the acceptance of error as part of the process of approaching the truth. the development of methodological rigour and the ability to draw conclusions and make practical decisions in the face of real problems (Granda&Bernabé, 2024). But in an attempt to understand their environment and face their personal and collective challenges, it is necessary not only that they know how to act incardinated in the scientific knowledge achieved by others but that they are capable of creating new knowledge, and it is in this line that they will especially concur, among other processes, the proposal and validation of theories, the design and execution of research projects, and open discussions.

2.2. Language Didactics

Science, in order to be taught, is articulated from the knowledge coming from language, understood as a symbolic system and component of social life. Language is not learned or taught in a vacuum; it always occurs in a specific discursive situation. Thus, language is proper to a text, which is inscribed in a situation of communication and in a situation of production. Hence, the didactics of language takes what language exercises, discursive genres (texts), as its object of study. Therefore, didacticism assumes that this static object (the text) can be transported (in the minds of the students), and that if there is teaching, it is reduced to doing so, but not to investigating the didactic conditions to generate a didactics of the object.

The teacher must start with a diagnosis of the knowledge with which students arrive at school and the type of relationships they establish with them. The knowledge that comes from common language is much broader than that which is presented in school knowledge; therefore, they manage them with a greater degree of autonomy and use them to satisfy social interests (Valbuena-Duarte et al., 2021). Therefore, in common language, knowledge is not organized in theoretical terms, nor does it reflect historical development, it is arbitrary and intuitive; that is, students do not know how to differentiate between ordinary language and the language of science, or even other specific languages. The didactic sequence is a set of activities linked and articulated in such a way that the students' previous knowledge is mobilized, corrected, expanded and systematized.

2.3. Mathematics Didactics

The analysis of problematic situations appears for the first time in a small private school in Budapest. In 1914, the Szamárful Institute maintained the principle of believing that the child was capable of being active and an attempt was made to create a group dynamic that favoured each student and group work. This small laboratory, where some influential intellectuals collaborated, ended up shaping Danish methodology. The analysis of practice tries to define and analyze the nature of mathematics, the didactics of mathematics and classroom situations, especially those typified as problems in relation to the work done in school. These three facets are interrelated and refer to some key elements that must allow the analysis of problem situations.

The mathematical analysis endorses the theses of the behaviorist model in didactics that considers that behaviors can be segmented into different stages, trajectories or subbehaviors and those tasks are approached from a sequential division of the stages necessary to carry out these behaviors. The mathematical dimension of representations and arguments has objective aspects related to mathematical representations, prototypical mathematical objects, and the comprehensive relationships between these factors and subjective aspects (Rey, 2023).

2.4. Intersections and Relationships between Didactics

- Cross-sectional analysis of contexts of subjectivity production: Didactic training devices. The didactic training practices generated in disciplinary spaces enable the construction of knowledge and knowledge and contribute to the generation of a subjectivity oriented towards teaching. Three problematic knots are extracted (production of subjectivity, training in and for teaching and the construction of practices) to address the construction of identity of the "psychological subjects" (Sansot). The production of subjectivity as a plexus of singularities,

unleashed by all the crafts of the "master", inaugurates singular processes in its sense: nothing is repeated or more of the same. We argue that it also happens in the order of theoretical constructions and, in particular, of the relations between them; From this perspective, the same type of reasoning is, once again, a form of neutralization of the singular, the methodological. Unless we understand that each situation generates unique problems that require resolving issues that arise from the filiation that these problems maintain with their antecedents. Guided by this objective, we will present a cross-sectional analysis of the contexts in which we produce didactic subjectivities. The choice of method is guided by the issues to be solved and the problems worked on. As a first step, we will review the three intersections between disciplines and then, based on a systematic study of the sources, we will situate our position in relation to the intersections and relationships that arise between didactics and the production of subjectivity oriented to teaching.

3. Research Methodology

The general objective of the study is to show the type of mathematical, linguistic and scientific performance presented by the students of the National Pedagogical University in their verbal, mathematical and scientific representations when facing situations related to the phenomena of electrification and magnetization. Specifically, the analysis aims to account for four constituent aspects of their performance in the different aspects of their mathematical, scientific and linguistic activity, which are: designating, organizing, recording and modeling. It is a descriptive study that allows systematizing and interpreting the mathematical, scientific, and linguistic activity developed by students around the relationships between magnitudes and interpreting the meaning that these relationships assume for them (Sánchez and Pascual2021). According to the above, the methodology used will allow establishing the type of mathematical, scientific and linguistic activity present from a discursive cognitive approach, around the situation of magnetization and electrification, since in the discursive cognitive approach the explanation of a phenomenon or concept is constituted by both the theoretical content and the control that the student has over his or her own cognitive activity. emotional, volitional and their historical-cultural development, whose thoughts and actions are considered to be informed by a discourse in which they are immersed and, on the other hand, the linguistic code and other specific semiotic systems.

The methodology used to carry out the research corresponds to a qualitative study carried out at the National Pedagogical University of Bogotá, in the Bachelor's Degree in Natural Sciences. It articulates different epistemological, cognitive, social and pragmatic theories related to the represented meanings related to signifiers, and was born as an element of convergence between research in mathematics didactics and in language sciences, with the aim of deepening knowledge about both mathematical and linguistic activity and thus guessing the possible connections and relationships between the two. It should be clarified that the model is the authors' vision of the relationship between oral and written language and mathematics, textual analysis and symbolic interactionism, which has been modeled as the exchange on different levels, the different statements are substantiated through research.

3.1. Research Design

The present research has a quantitative cross-sectional design. The aim is to compare the incidence of didactic situations quantitatively before and after the implementation of the Institutional Project, through a questionnaire and an interview, carrying out an exhaustive study on a population chosen at random within the CASD Educational Institution. The test that is developed for this purpose presents 20 questions divided into the categories: mathematics, language and natural sciences.

According to the concepts indicated, the quantitative nature of a research addresses facts, phenomena, concepts and problems verifiable through techniques that produce data as objects of study, while concentrating on the precision of the data seeking to establish the relationships between them, so that the results obtained at the end of the research process indicate the possibility of generalization. As for the time of this research, it is transversal, it is made up of students between three (13) and five (15) years of age, which allowed us to identify the change in the educational environment and observe how it was located with the student and teacher population, generating a satisfactory relationship with the institutional project for the research.

3.2. Selection of Samples and Participants

The problem situations chosen are located in the three selected transversal axes. A data collection instrument has been developed consisting of record sheets that refer in their structure to key aspects of each of the situations: basic competences and, specifically, the different levels of competence, transversality, evaluation, the type of activities generated, the space and time required to carry out the internship and the material resources themselves.

The selection of the corpus sample of situations has taken place, in the first place, on the total of the didactic situations that form it, in order to study the degree of transversality that they achieve throughout each school year, regardless of the level of competence, understood as transversalized content, based on the comparison of these with the universe at each level of the transversal axis concerned. This step, understood as general or macro

general, is followed by the specific or micro generalizer, consisting of the comparison of the corrected situations of each school with the corpus. From the study of the transversality provided by each of the selected axes, the necessary data are generated with sufficient figures to verify the degree of real proposal or presence.

3.3. Data Collection Instruments

The data collection instrument was didactic situations. A way of facing a problem and the choices and transformations they make, which are of four types, transformations that allow students to give answers to the situation and, on the other hand, give answers to the teacher that leads to a correction. Works of human ingenuity always closed demonstrate a set of individual facts or properties that are defined as the datum of the situation. Data collection was carried out on a fixed schedule of one year. During 10 weeks of the first academic year, a self-evaluation report was made with written documents submitted at the end of each situation. 10 mentions were made to teachers in training by students, with various queries on the subject. An individual interview was conducted. Registration sheets were completed as a specialization teacher, internship supervisor, class observer, pedagogical advisor of a student. Analysis of the corresponding subject, classrooms and teachers who teach in the school. First semi-structured interview with the participating teachers of the Secondary School Home Control Curricular Space and with four students chosen at random in each grade. Second theoretical adjustment interview. Both interviews lasted approximately 40 minutes. Both were recorded on a portable recorder, at the initiative of the research professors, and transcribed by the same author.

4. Analysis of Didactic Situations in Natural Sciences

The way in which each of them is organized is based on an accumulation of social practices described and naturalized, constituting a specific cultural knowledge, which is also transmittable. It is in this text, focused on the dissemination of knowledge, organized by this one of low meditative pressure, medium/semi-diffuse, partially selective, with prior knowledge and known by the recipient, complementary, osmotic, interpreted from the teacher and acquired by observing encyclopedic (Miranda and Ortiz 2020).

The situation is organized in five stages; the teacher regulates only in terms of selection. The diffusion of knowledge of data, with little socio-cognitive activity, goes towards memorization, without a premeditated activity of comparison, classification and identification of concepts, it is not regulated according to the factor of knowledge with the consequent problems of meaning, since the information knowledge, necessary inferences, unknown relationships is very compartmentalized and loose, without being integrated into a simple organic model. It does not properly organize knowledge, it does not distill a model, and it is not possible to properly talk about what students are expected to learn, since what has been learned is a learning situation to solve the assessment situation (Escobar et al., 2022).

4.1. Conceptualization and Characteristics of Didactic Situations

In the same way that one cannot not communicate, one cannot not learn. This is the idea behind constructionist theory. Just as we construct meanings for ourselves, in a dialectical design between what we already know and what we notice, the act of learning requires the constructive manipulation of neighboring cognitive structures. This uninterrupted act implies subsuming, assimilating the novelty to the previous heritage and generating imbalances that impel us to seek new balances. In addition, the emergence of novelty by symbiosis means that immediate construction can only occur during an instant prior to storage. This constructive process is embodied in three paradigms: action/operation, assimilation/accommodation and metalanguage. Actions are not external but internal: they transform the very content of the cognition that performs them. Thus, assimilation is the necessary context for the realization of a new operation. However, in order to assimilate something I need to accommodate it to a neighboring cognitive framework. The operation of assimilation/accommodation entails a metalanguage that, in turn, needs specific operations to be introduced. Therefore, every situation will correspond to a model of conversion: how we construct the object of knowledge. Likewise, a model of meaning: how knowledge is meaningful to the learner. And a typology of learning styles.

In analogy with the concept of knowing is power, the idea is that every problem is a problem for someone or, technically, for an intelligent subject. In relation to the intervention of the specialised support assistant in the classroom, he or she must explicitly or implicitly provide students with significant learning situations. But on many occasions the teacher has schooled his knowledge and finds it difficult to interpret the difficulties of the students, as well as to design proposals to face them. Through plan-to-plane analysis, we break down complex situations into challenges, problems or standard and general issues. The proposal is, on the one hand, an empirical study that allows a thorough and objective knowledge of the situation that challenges the student. Next, an analytical approach that analyzes the challenge, outlining two moments: on the one hand, the basic cognitive processes involved and, on the other, the cultural elements that must be internalized. And finally, we can address the study of the typical relationships: between the elements of the content and the cognitive process to one of the processes of the curricular project and the learning style, serious working hypotheses that serve as

support for the teaching methodology, to design the details of the didactic situation and to explain the explanatory manifestations of the student.

5. Analysis of Didactic Situations in Language

For the acquisition of the concept related to the didactic situation of language, it was sought to observe and record whether and how varied modalities of oral communication occur in the different groups of the only two participating third grades, among them: forum, student instructions, self-explanation, soliloquy, whispering, among others. And since writing is much less common, when dialogue is used as "a form of non-everyday orality" and because it represents at least a quarter of the didactic situations in school plans, three more boxes with sections in which they are present will be observed. The first is an anthology and will include the elaboration of literary texts based on given proposals, texts created by the students themselves or both modalities; the second is a library formed by the reading and comprehension of cultivated works (Muñoz & Córdoba, 2023).

And the last box is how to do with the language sessions, for example, on research of works, writing of biographies, which implies a whole philosophical attitude since it is necessary to "discuss, debate, generate doubts, ask questions, seek and understand sources in various texts, interviews and field studies". This new time is continuous when "the children are asked about experiences similar to those lived by the characters in the text, or about their own personal reflections" and interferes with "the moments of activation and presentation of the new knowledge without forgetting what the teacher himself said previously".

5.1. Importance of Didactic Situations in Language Development

Vygotsky states in his theory on the role of context in teaching-learning that speech in children serves as a means of maturation of certain higher psychic functions that appear for the first time as forms of internal organization of behavior that is its functional inverse. In addition, he takes up the semantic character of the word, of which he says: the language of the mentally retarded is, above all, an individual within them, it is not functional (Elejalde2021). I mean that they do not accumulate in their words the meaning of the situations produced in their immediate environment, therefore, they do not generalize them. The important thing about discourse is not the form of oral expression, therefore, single words or mechanically repeated expressions, but alien to the context and the communicative intention, are empty, meaningless. In this sense, words alone have no meaning, they acquire it by embedding themselves in a discourse with a certain functionality. This is why in the theory of enunciation the enunciation is proposed as a singular event capable of mobilizing and organizing a series of elements within a significant cognitive activity. Language is born from a deliberate act of communication. For a statement to be constituted and organized, the elements of its significant functions must be delimited, so that each statement constitutes a whole greater than the sum of its parts and because of this condition of totality, each new statement is a creation. In this regard, it is specified that a world is enunciated, an enunciating intention, a mode of referent organization, objects, meanings, resident in a system of actions and situations. For this reason, the tensions and representations that the external world produces in the world of the individual's values and convictions give rise to the statement.

6. Analysis of Didactic Situations in Mathematics

Situation 1: Bingo is played. The content is a delightful mathematical bingo for children, which is enjoyed in class for fifteen or twenty minutes, but which has not been properly instrumented: the teacher does not point out any difference between the quantities that are shuffled and those that the child has on his card. Therefore, this is not justified. It is not presented to him by means of objects or manipulatives to discover it, not even by mental objects. In the course of the game, the teacher completes two other platforms. With one of them, the numbers 40 to 60, the child recreates the decreasing numerical series in tens, paired with each number of the missing number until the hundred is completed. There are no problems in understanding them. With the platform of the numbers 20 to 40, the child dialogues and plays in a symbolic way with the odd amounts. At a later stage, other quantities are taken into account. A conceptual objective for the cycle is thus proposed, which is tangentially manifested in the didactic, instrumental unit, and does not arise during the game. Due to the imprecision in dealing with odd numbers, the child has to solve complex situations such as counting 2 by 2 from the first odd number greater than 20. Only after the situation is resolved is the data for the cycle clarified and supplemented.

Situation 2: Listen to the sound register one by one. In this didactic unit, a classification corresponding to that of the cycle is positioned. The classification of numbers into two large groups appears, little worked: that of natural numbers and that of whole numbers. Following this is the classification of natural numbers into two subgroups: odd and even, in this order. Almost as a finishing touch, the whole numbers are classified within the blackboard, highlighting the similarity between them and the natural numbers.

6.1. Role of Didactic Situations in Mathematical Learning

The proposed didactic situations were always aimed at the area of mathematics in secondary school and no longer in the area of natural sciences and language. Basically, what we found is that, for the most part, at the

secondary level, the teacher continues to handle whole numbers, fractions, decimals and percentages, which we verify by reviewing the sections referred to for it. However, the didactic situations designed are not aimed at the youngest students and, due to the result we obtain from the sections made at home, this is appropriate for the level of the students. This situation is found from very immature children, and another element to consider is that each child responds to their way of understanding. Those with a way of understanding are still green; the development of their capacity for mathematical reasoning is negative (Romero et al, 2024).

As we have seen, to know how they have to write down the decalogue, it is clear: they write down the transformed, but what if the two elements were transformed? The designed learning situation can lead to students confusing a new concept of antithesis with another one they had, so the teacher must be very attentive to the first time the student has to go through this process. This happens in different phases of the discrepancy itself, where they have to take the price of an item on which they offer a discount, and this percentage has to be added to the original price.

7. Results and Discussion

This paper reports the results of a proposal for the analysis of didactic situations used to carry out a prospective study on the possible changes of these elements in the classes of Natural Sciences, Language and Mathematics with first-year high school students. These results are of particular interest to teachers and counselors, since their scope of relevance was constructed considering three specific subdisciplines. Botany as a discipline of Natural Sciences, which in a curricular proposal that includes learning linked to the understanding of the natural environment, is addressed with first-year students as the study of a terrestrial ecosystem. Fractions, through the Language class, which could well be understood as Mathematics linked to this subject. Finally, the axis of coordinates within what is defined as Mathematics Education is quite far from a discipline of accuracy in many of its subsector, which avoids direct dialogue with the ideas that students have.

From the results found, it can be deduced that the semiogenetic didactic system is ideal, since it is necessary for the teacher to explain it, but if he does this, he must have great skill and handle a lot of material, while his students become very passive and depend on the notes and activities presented in class. Although this system does not achieve a level of RPT that is considered optimal, it would be ideal for the didactics of Botany to explain it in a theoretical and didactic way, providing material and theoretical support to its students through its classes, making them understand the reason for the phenomena and through the performance of the activities.

7.1. Findings in the Natural Sciences

The object of analysis of this case is the organization of the teaching of Natural Sciences based on the implementation of the Generic Didactic Situation "Construction of Instruments for the Registration, Interaction and Communication of Words and Phrases". Far from being restricted to its specific field, as happens to us when, in front of a film, we choose to isolate one of the sequences of a film to study it stripped of the mediated relationships it maintains with the other sequences, we assume that it interacts and produces transference effects in the operation of genericity, since working with other SDGs always enriches the appearance of both conceptual and procedural contents of these subjects. For the purposes of venturing into the main proposed research material object, *a priori*, we consider it reasonable to collect from the official didactics of the natural sciences a typical sequence applicable to the last cycle of the year in 4th. These sequences are defined as the directed didactic strategy -articulating contents, activities, methods and resources- with a view to carrying out a certain set of Didactic Itineraries in a Didactic Situation of Singular Formats; they fulfill different functions, the most important being the improvement and dissemination of certain knowledge.

The main contribution of the Natural Sciences to our object of study lies in the verification in historical and contemporary sources of the emergence of the need to record the psychic activity expressed by the protagonists of scientific practices. Facilitating the students' appropriation of these initial questions, exploring alternatives of action that correspond to the different conceptions of the actors (categorization of knowledge, opening of spaces and lax relationships that advance and retreat) constitutes the axis of this proposal. A second axis focuses on the recovery of the active participation of the different forms of communication (oral, graphic, written, iconic, objectual, mathematical) resulting from the appropriation of instruments for the constitution and development of scientific paradigms.

7.2. Language Findings

1. The user Leny shows that he knows partially about types of correspondence about language, since it is difficult for him to decide between Slope and D2, 30 and A1 respectively. 2. Leny, despite knowing some concepts of correspondence, cannot use the formula to obtain a constant non-proportional variation of two quantities represented by tables. The FM where Leny studies does not provide her with information about formulas or properties. It was not everyday for this user. Leny masters the concepts of correspondence and rate of exchange and remains at a first-grade level of pedagogy. Does not interact with the teacher or with their peers in this regard. 3. The student does not know the concepts of variable and unknown and tries to increase the rate

of change by maintaining one of the variables, achieving a third-grade processing. Linet does not know the direct formulas that allow him to find fixed odds by means of rules of three, he only studies tables routinely and does not use proportion for daily operations. He masters the concepts of exchange rates, correspondence and variable, so he reaches a plan and projects and analyzes the results, discovering the ways to calculate constants, putting two together and identifying the key points of the project, using tms and equations. He remains at a third-grade level of pedagogy. Resorts to student-student interaction to agree on the parameters of each project, does not interact directly with the teacher to solve problems related to tms.

7.3. Findings in Mathematics

Until the conclusion of the analysis of the didactic situations of mathematics, we observed that the sequence of random selection attributes to the child that the didactic objective is focused on solving problems with various types of associated issues and that the manipulable content is urns and animals. He begins by choosing a worksheet that offers him specific characteristics and, then, through personal drawings, he represents the two steps that, according to his interpretation with the written text, the three characters of the worksheet follow so that the didactic objective is carried out. Two groups are drawn by lot. One animal is selected per group and a test is carried out with one of the animals to examine whether it has the right characteristics. Yes: party. No: another draw, etc. Each step is done by means of an urn, initially represented empty. In the selection of didactic situations, many of the cases present, as we expected, similarities in the selection of mathematics activities, one didactic situation, and the evaluation measures, the other didactic situation. Specifically, ten of our children propose a novelty in the activities planned by their authors (seven cases of spatial location). This fact is linked to cases where we observe various reasons for proposing the activity and the verification of its effectiveness when the competent combination of materials proposed encourages the student to be sufficiently autonomous to check and learn from the process is justified.

Regarding the titles of the didactic situations, six children attribute it to the manipulable content of one of them, while the other ten identify both titles with the same content: we witness two assassinations, the child correctly identifies the two dilutions and all the possible Nobel cards to identify the two liquids. Among the situations that present some problematic aspect, I observe special attention in those that are not useful for their reliable evaluation, or the manipulable content of the other history of cinema, it seems to me that they represent the student who has read, but, as we cannot forget the comparable and generalizable method proposed, it does not allow the comparison and generalization of its data or other universal candidacies.

7.4. Comparison and Relation of Findings

Replace sentences. It is thought that this activity will serve to strengthen autonomous attention.

When we compare the didactic situations at the level of mathematical function, we notice that in Spanish Language there is the construction of a mathematical function that is carried out in a didactic situation with the written production of a girl, although the teacher gives it as the correct answer and performs $\pi=3.14$; this aspect was not considered since in the case of Spanish Language the interest was how it approached the production of the girls studied. In the same way, in natural sciences, the mathematical function was also studied, but in the case of judicial reality, the research was focused on a different aspect: what was the valuation of young ladies. Both studies shared the purpose of studying how the observed girls used the tools and produced solutions to problematic activities. In the same way, by comparing these analyzed situations, we were able to relate results between natural sciences and mathematics, specifically levels. At the same time, with Spanish Language the transcribed didactic triangle begins to make sense. In the same way, with this study we share and complement the systematization of didactic knowledge with a concern for the formation of agreements. Below is the transcription of the didactic triangle.

8. Conclusions and Recommendations

In science, you never put a word where you can put a formula. The purpose of this work was to identify disciplinary and metadisciplinary learning that is put into play in didactic situations specifically chosen from the fields of language, mathematics and natural sciences, from the teacher's point of view and confronted with these situations. The corpus of work is small, which prevents generalizing results. But the situations analyzed give a glimpse of the multiple interwoven threads that make up any educational situation and there are enough indications that would invite us to continue delving into this aspect. In addition, the agreement observed between the subjective point of view of the teachers and that assumed from the research underscores the possible robustness of ANADIS to be able to articulate an educational diagnosis. The conclusions we present are anchored in the didactic situations analyzed and in the articulation of the findings with the state of the art considered. For the first case in particular, the learning and learning areas surveyed from the complexity of the interweaving of these areas with the disciplinary ones. In relation to disciplinary learning, only a first approach is made to observe the link that these present with the metadisciplinary ones. Thus, disciplinary learning has been characterized by always referring to disciplinary objects that arise from the natural problems that are at the

basis of the very construction of the delimited disciplines. On the other hand, we have been able to observe throughout the work the close link between disciplinary objects, the mastery of objects of pedagogical legal function and the text as an essential problem in all scientific-school knowledge.

8.1. Synthesis of the Results

The analyses of the teaching situations that have been presented show the intentionality of the school discourse in the first grade of primary school between the areas of language, mathematics and natural sciences. Textbooks in these areas of knowledge have a variety of acceptable forms of school socialization among children of this age. In mathematics there is a cultural management that gives meaning to the calculation of operations, based on a real intention of measurement not always counted as part of the skills and the origin of number sense in the calculation of elementary operations, by giving concrete and real solutions.

In the case of language, there is an intentionality in the application of reading and writing with letters and contexts with meaning from preschool, to qualify writing and reading. In this sense, it is evident that pre-written language and written language do not present marked contrasts, through the different situations that arise. This makes the scope of the contents proposed in these degrees complex. On the other hand, the questions asked to students focus on truly significant contexts that encourage and facilitate student participation. The particular way of structuring the sentence with the intention of looking for parts of it is also evident and marks the metalinguistic character that is given to the content without giving it a particular significance. The teaching-learning context of the teacher's natural sciences area with respect to aeronautics can be observed in the form of questions about the problem raised, in order to seek that students know the mechanism of how aerial objects work through laboratory experimentation.

8.2. Implications for Teaching Practice

The discussions previously raised regarding didactic situations, the role of the teacher, the curriculum and the Triple Helix, make us see the importance of the teacher having sufficient knowledge and elements about didactic situations to be able to better understand their impact in the classroom. It is advisable for the school to contribute with its teacher training to the development of the quality of teacher training so that it can offer students significant learning. It is proposed to implement three axes of training: research-didactic, pedagogical mediator and knowledge mastery. In the first two, the teacher is able to find sufficient elements to understand and establish the links between the work done by the parents, the community, the displacement classes and the work done in class.

In the axis of mastery of knowledge, Spanish teachers have it in contrast to the area of science, mathematics and English. We consider enriching what was proposed by the former with the work of analysis of the didactic situations, since it is a matter of the teacher, moment after moment, analyzing how this work plan lands in his group; if the group is making it its own and is achieving it, if many non-formal expressions are being allowed that are taking it away from the development of the topic, etc. Thus, this second axis is being given an academic or formative profile, in the sense that the teacher will be provided with elements so that he can act deliberately based on the results of his decisions.

8.3. Study Limitations and Areas for Future Research

Although we achieved a significant number of sections of the study programs, we were not able to recover other important aspects that are part of them. For example, cross-cutting themes, guidelines for handling group activities, individually, the way to approach theories linked to the content of an aspect, explicit recommendations on the types of questions evaluated in exams, the way in which academic work is regulated in the classroom, among other aspects, become crucial axes when defining the student's curricular profile. which would also be relevant to the work presented here. Through this work, the existence of causal relationships is not affirmed, but mutual influences are affirmed, so that approaching quasi-experimental designs assuming the official study program would make the results directly attributable to the design of the curriculum. If any aspect related to decision-making were to be investigated, other theoretical elements that they suggest should be obtained. It is clear that including the elements of decision-making was not easy due to the nature of the curricula of each of the subjects, where the elements are not separated from them. For this reason, all the information is clearly disaggregated, according to subject, chapter by chapter, document by document, taking care to clarify in most cases how each of the elements taken from the EPs was surveyed.

It would be interesting for later work to systematize this information, with a greater number of pages dedicated to each of them. Likewise, if the information found in the official documents is specifically related, decision-making should be an area of special attention in the curriculum. They should provide us with theoretical elements and some criteria that serve to facilitate decision-making at the school level, in the group and in the area plan. It would also be one of several contributions to the work to carry out a similar curricular analysis for educational support systems; however, given the characteristics of these assistants, it is the belief of those who

subscribe that their influence is less important than that of the curriculum; approximately, the influence of the curriculum is much less explicit and smaller.

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