The use of Wittgenstein's language games to promote argumentation in children at the beginning of scientific literacy: a proposal for analyzing the Argumentative process

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Abstract

The insertion of the individual in the scientific culture goes through scientific literacy and this, through teaching that privileges research and argumentation in the school scenario, mainly in Science classes. Based on indicators found in the literature that point to scientific literacy and models proposed by Lawson to define the structure of the argument, a table was elaborated to relate the argumentation of children in the second year of elementary school, leveling it in five levels that point to the logical reasoning and the dominion of content, taking into account Wittgenstein's linguistic games. To analyze what level the children were at, a didactic sequence was elaborated that allowed the observation and study of the arguments used by them. Considering such activities and the children's age group, it was observed that they tend not to complete the argumentative sequence, but they already have strong traces of scientific literacy.

Keywords: language games; scientific literacy; elementary school; argumentative process.

Introduction

Children are endowed with a unique curiosity regarding the desire to understand the world around them. When it comes to students inserted in the first years of schooling, in which they come into contact with the various areas of knowledge, it is usually common to witness them, inside and outside school walls, explaining everyday phenomena, exposing their hypotheses and conclusions about varied themes (VIECHENESKI AND CARLETTO, 2013).

However, when educational support does not take place in order to develop the creative and critical spirit of children, the chances of growing adults who fail to dominate minimal scientific information are increased.

In 2015, the Abramundo and Paulo Montenegro Institutes and the Non-Governmental Organization Education Action released a document entitled “Scientific Literacy Index”, the result of which showed that a mere 5% of respondents declared that science exerts influence in their way of perceiving the world and to face and resolve complex episodes. More than half of the polls are not even able to appropriate the knowledge they have learned in the classroom to use in everyday situations.

Notwithstanding the information mentioned above, Melo (2014) warns us that such an analysis of the topic would be incomplete without considering how essential scientific literacy is in the formation of the individual's critical sense, since it acts directly in people's routine, making complex tasks that could be simple if they were supported by scientific knowledge. This reality leads us to believe that producing and disseminating science is essential to change this scenario, since the consistent and systematic dissemination of scientific material provides the population in general the access to science that is present in everyday life.

The present work is based on the extreme relevance of this subject, especially in the context of Brazilian education, as it implicitly raises the discussion at the moment when it seeks to analyze how the use of practical experiments in the classroom in conjunction with the analysis of the discourse of children can guide the teacher in the process of scientific literacy of children in the second year of elementary school, to understand how scientific argumentation takes place in the classroom, seeking to improve it.

Language Games at the Beginning of Scientific Literacy

For many years, several authors have been studying and discussing new methodologies and teaching tools that provide students, especially those who are at the beginning of the learning process, a contextualized and effective experience.

From the analysis of authors who deal with the themes Scientific Literacy and Scientific Method to children, Paul Hurd stands out as an important reference, because he was the one who first used the term "Scientific Literacy". Such an expression had been used by him in the 1958 publication entitled "Science Literacy: Its Meaning for American Schools", the first of many other texts published over the years. He focused his studies on the Science curriculum and was responsible for commenting on relevant circumstances and events in history in which Science teaching initiates the conception, albeit poorly formed, of the idea of scientific literacy.

However, it was Hazen and Trefil (1991) who made a distinction between "doing science" and "making use of science". In this context, the teacher has a fundamental role, as he should be an encourager of the students' imagination and creativity to investigate causes, elaborate and test hypotheses, formulate and solve problems and create solutions based on the knowledge of the different areas of knowledge. Thus, children will build their vocabulary and cognition for “argumentation based on facts, data and reliable information to formulate, negotiate and defend common ideas, points of view and decisions that respect and promote human rights and socio-environmental awareness” (BRASIL, 1996; 2010 section 1, p. 10).

Regarding the argumentation and the communicative process for the construction and structuring of scientific literacy, this work is based on the “language games”, a concept created by Wittgenstein, to express the semantic relations existing in different contexts (SANTOS AND NASCIMENTO, 2010).

Wittgenstein began his investigations, examining and presenting the whole process by which the transition from epistemological discussions to those of language occurs. For him, language has a similarity that allows correspondence with the world. Such a relationship so absurdly intimate is it so obvious that only the logical analysis of language would be able to be the only possible and guaranteed method of investigating the structure of reality.

For Wittgenstein, it is in the totality of propositions that language is formed, since he not only considers the proposition to be the smallest linguistic unit, but also elevates it to the level of fundamental concept of his theory, being it the object of his critical analysis (DUMMETT, 1981). In this way, it is possible to perceive the way in which such propositions become vehicles of expression of thoughts. The author also discusses, in a subsequent moment, about the internal structure of language and explains how it should be structured in such a way as to indelibly mark the distinction between saying and showing, that is, the barrier between what can be clearly said by means of propositions and what can only be shown (ARRUDA, 2017). Wittgenstein makes the distinction between saying and showing very clear, since language has the competence of description. However, such a function is limited. Therefore, there are circumstances that can only be shown, once the word is insufficient.

The concept of Language Games comes, in the interim of this research, to add value to the process of scientific literacy carried out at the beginning of Elementary School and, consequently to the proposal presented by the present investigation, when the author conceptualizes the term “language games” as being the meeting and the diversity of words that, although not having a static, inert and eternal meaning, designates a specific activity. He makes it clear that words are instruments used to organize the assimilation and apprehension of ideas from one particular person for another within the same historical moment.

When it comes to children and adults inserted in a classroom, the quality of the teacher's argument in the face of students' questions is extremely important, since, at this moment, knowledge is being constructed so that the student can achieve more and more build their own argumentative hypotheses, improving their logical reasoning about the scientific facts that permeate the day-to-day.

We know that building the bases for scientific knowledge, especially with regard to the first years of elementary school, is something very complex, since the child is still receiving the first touches of a formal scientific culture. Therefore, the argument can, according to Sasseron (2008), use empirical and tangible data to conceive, even if this process takes time, which can make it difficult to perceive the structure of the argument, even for a teacher interested in repairing the argumentative evolution of the class.

Lawson (2000) also set out to understand the structure of the argument, using hypothetical-deductive reasoning for the elaboration of argumentative ideas through the “SE-THEN-THEREFORE” pattern, arguing that the acquisition of new knowledge always starts by observing disorganized occurrences, which the teacher must propose to formulate considerations of possible causes. Lawson (2002) believes that the “IF-THEN-THEREFORE” pattern has a cyclical character from the moment the individual receives more information about the analyzed situation and realizes that such information does not change them, but allow us to make a reflection wider and complete. Lawson's proposal can be illustrated using the flowchart shown in Figure 1.

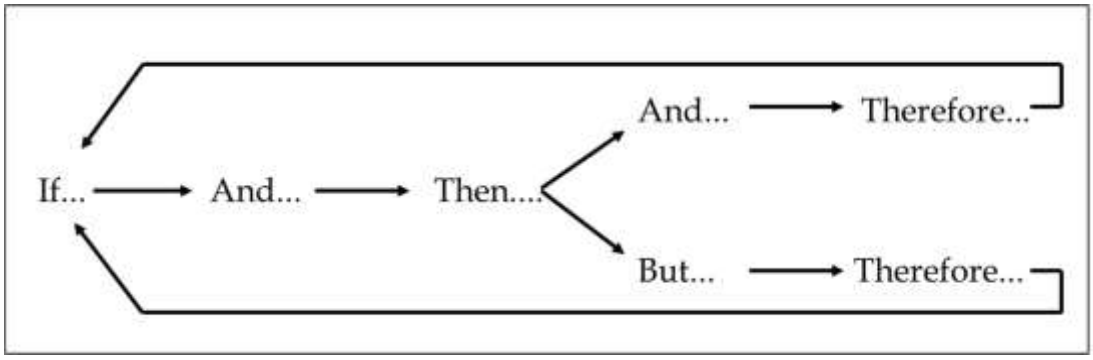


Figure 1: Standard proposed by Lawson (Adapted from Sasseron and Carvalho, 2011).

Composing the thoughts of Lawson and Sasseron, we can say that for each proposed hypothesis, a test is performed (AND) and a prediction (THEN) is constructed. Thus, the final result of the argument is linked to the fact that something happens in the specified way and that it has been tested.

Lawson's argumentative pattern is very objective and clear in describing the stages of understanding construction to support the argumentative work. Such clarity is essential to understand how important the argumentation is for this research, since at the core of the scientific literacy theme for children at the beginning of Elementary School, argumentation must be widely used, first by the teacher and later by the students, since it is fundamental in scientific culture at all levels of research. Therefore, exploring it at the times when learning is taking place is a strong indication that scientific literacy is taking place. Não obstante, os jogos linguísticos wittgensteinianos em sala de aula também devem possuir argumentos contundentes e de fácil entendimento para que os alunos se apropriem da cultura científica, compreendendo e conseguindo exercitar o jogo propriamente dito.

2.1 The Indicators of Scientific Literacy

The knowledge of indicators that make it possible to assess whether the process of scientific literacy has been achieved is essential for the teacher to have an adequate performance during classes. Within this perspective, the indicators presented here aim to expose some necessary skills at the time when working on scientific literacy as a process of knowledge construction. Below are the indicators (PENHA, CARVALHO AND VIANA, 2009) that served as support for this work. Are they:

1. Indicators for working with research data: Indicators of serialization of information, Indicators of organization of information and Indicators of classification of information.
2. Indicators for structuring thought.
3. Indicators for understanding the situation analyzed: Hypothesis survey, Test of the hypotheses raised, Justification, Prediction and Explanation.
4. Procedural indicators.

The fourth indicator is, in this work, of great importance in the scientific literacy process because it is related to the students' concern to establish, elaborate or build strategies or attitudes that aim at structuring procedural sequences. For the indicators to actually happen in the classroom, Gil-Péres (2001) states that

classes should be creative and take into account the students' interest and the pertinence of situations, a proposal that converges with Freire's ideals, which advocate a significant education.

Practical classes as a tool for the argumentative process

In this work, practical classes are treated as an important tool for significant learning and organization of the hypothetical-deductive reasoning of children at the beginning of the scientific literacy process. Thus, the structure of the argument produced by the children during a Science class will be analyzed, such that the speech used by both the teacher and the students is considered the language game that aims to improve the students' vocabulary by giving the meanings of the new words relevant to the Sciences, forming the basis for Scientific Literacy.

The observation plan of this research was based on three fundamental structures: (1) the didactic sequence entitled “The importance of water and light for the maintenance of plant life in general”, (2) recordings of the discussions raised during the classes of Sciences for later transcription of the speeches and (3) records prepared by the students at the end of the activities.

To analyze the discussions presented by the children, 5 levels of argument were created, shown in Table 1.

Table 1. Leveling the logical reasoning of the argument.

	Diagnosis of Argumentation
Level 0	Has no logical reasoning and does not even know the subject
Level 1	Has part of the logical reasoning and knows little about the subject
Level 2	Has part of the logical reasoning and knows the subject
Level 3	Has logical reasoning, but does not know the subject
Level 4	Has logical reasoning and knows the subject completely

Source: From the authors.

This scale of argument was based on the indicators of structuring thought, which include the logical reasoning and the proportional reasoning proposed by Sasseron (2011) about the levels of scientific literacy, and the sequence suggested by Lawson (2002) about the structure of the argumentation, bringing as reflection Wittgenstein's studies of the linguistic games used.

3.1 Didactic Sequence

In order for the argumentation process to be developed by children during classes, a didactic sequence was elaborated that would enable the teacher to provoke students questions and explanations about the topic addressed.

Next, it is presented the general objective of the practical activity and the materials used in the classes, according to the didactic sequence shown in Table 2:

- Objective: To study the parts of a plant and identify its functions, as well as to explore the diversity of plants and their characteristics.
- Materials used: Book or didactic material; 3 disposable cups; earth; beans; 3 labels and 3 small cardboard boxes (shoe packaging).

Table 2. Didactic Sequence

Class	Objectives	Class moment
1	Presentation of the question that generates reflection and discussion that makes students think about the development of plants. Provide reading material to support the expansion of the scientific vocabulary in order to make the children build relevant meanings on the subject addressed.	1. (20 min) Reading and analysis of the poem: “Lição de Biologia” (AZEVEDO, 1998). 2. (30 min) Questions that generate discussion and reflection.
2	Explanation of the teacher about the parts of a plant, as instructed in the didactic material, in order to verify the knowledge built by the children in the previous class. Presentation of the question that generates discussion and reflection in order to collect the arguments expressed in the students' answers.	1. (20 min) Didactic activity with resolution of exercises. 2. (30 min) Questions that generate discussion and reflection.
3	Practical activity with dynamics supported by Paulo Freire's problematic education in order to observe the behavior and dialogue of children at the time of planting the beans so that we can collect the hypotheses and expectations of the children for further analysis.	1. (30 min) Guided by the teacher, students should plant the beans grains in 3 plastic cups, considering different situations: (i) seed with water and light, (ii) seed without water and with light and (iii) seed without light and with water.
4	Question the students about the different ways of planting vegetables in order to gather hypotheses and arguments that arose at the time of the students' speech.	1. (35 min) The teacher will raise questions gradually so that students can explain what they think about the different questions the teacher will ask. 2. (15 min) In the final moment, the

		teacher will explain why the planting of different vegetables is not exactly the same as each other, explaining that not all plants have seeds or grains, like beans.

The entire didactic sequence containing the guiding questions and the details of the activities is presented in the

3.2 The application of the didactic sequence

The application of the didactic sequence was carried out in a school in the state of SP/Brazil, with a class of 22 students of the second year of Elementary School in the months of September and October 2020. The application occurred in the online form, due to the Sars-CoV-2 pandemic, in 4 days of class. The activity aimed to build knowledge about the linguistic game "The importance of water and light for the maintenance of plant life in general" and to identify the main parts of a plant with their respective functions, analyzing the children's speeches for identifying the levels of arguments found.

At home and in the presence of a responsible adult, students manipulated materials that allowed the planting of bean grains in the face of different development variables. Then, the linguistic games were introduced by the teacher, which led to adversities of an imaginative nature in which the purpose was to make them manifest and discuss the questions asked based on each other's prior knowledge, opening up the opportunity for new concepts.

During the classes that followed after the planting of beans, the students, instigated by the teacher, discussed the questions presented by the proposed linguistic game, explaining their hypotheses, constructing explanations and justifications. Thus, the activity provided children with moments that could express their logical reasoning, evidencing organized and structured information within the argumentative sequence proposed by Lawson (2002).

Results and discussions

4.1 Spoken Texts

The following will be presented as results the main excerpts of the children's speeches in class in which the didactic sequence was applied, detailed in Table 2, as well as the classification of the level of argument that fits the child, as shown in Table 1.

The transcripts of the dialogues were written in the form of tables that, in general, are composed of five columns explained below (SASSERON, 2008):

1. The first informs the reader about the speech shift;
2. The second presents the full transcript of the speeches of both the students and the teacher, taking into account the gestures and actions corresponding to the shift;
3. The third column reports concise appraisals of the shift referring to the theoretical part of this research;

4. The fourth column presents the scientific literacy (SL) indicators;
5. The fifth presents the details of the arguments found in this shift.

The keywords that were not spoken by the students, but were implicit in the arguments were presented in parentheses.

During the development of the classes, some questions were decisive for the movement that generated reflection and the arguments to take place. These questions were called “questions that generate discussion and reflection”. One of the questions was: "If instead of planting beans, we planted the stem of a flower, would the same thing happen with beans?". There were several responses, however, the ones that stood out are shown in Table 3.

Table 3. Transcription of the speeches related to the questions that generate discussion and reflection in class 1 and analysis of the argumentative structure.

Shift	Transcribed speeches	Brief analysis	SL indicators	Detailing the Arguments
1	(Student A) It would happen, because (IF) the flower has life (AND) everything that has life sprouts, (THEN) it only needs soil, water, fresh air and affection ... oh and light too!	The student has logical reasoning, but does not fully know the subject. Argumentation: level 03	Justification Prediction Explanation	The child presents Lawson's argumentative structure, however the child does not know how to germinate a plant. When affirming that “the flower has life and everything that has life sprouts” the child makes use of inductive reasoning, starting from a particular data for the construction of a general rule.
2	(Student B) No, aunt! Only the seeds can sprout. I studied at a school and the aunt from there said that we were the seed of the future. It is from the seed that the tree is born.	Argumentation: level 0	Prediction Explanation	Lawson's argumentative scheme does not occur in this example. The child presents empirical and particular data for the definition of a certainty. Inductive method.

Source: From the authors.

It is important to highlight the role of language games played by the class teacher and the children, which are translated by the utterances pronounced at the time the activities were suggested and carried out, being fundamental in the presentation of the ideas of both (adult and children) and consequently in the use

of SL indicators when they needed to register their understanding of the activity. The SL indicators also appeared in some of the explanations collected, substantiating the ideas declared by the students. Such explanations will be presented below in the tables that illustrate the most eloquent speeches of the children who represent the argumentation studied within the proposed linguistic game, revealing elements of the SL.

Table 4 shows how the proposed content was introduced by the teacher to the students, with its scientific and pedagogical peculiarities in view of the development of the repertoire of words belonging to the linguistic game characteristic of the universe of the studied experiment.

Table 4. Presentation of the linguistic game that introduced transdisciplinary thinking.

Shift	Transcribed speeches	Brief analysis
3	(Teacher) Kids, when we talk about science, we usually remember only the environment, animals, plants and the human body, but science is much more than that! We must reflect on the other aspects that are involved in the phenomenon that we are studying, such as, for example, the economic and social.	The proposed linguistic game aimed to introduce transdisciplinary thinking. The researcher instigated students to create relationships between their previous knowledge of the world and the experience studied.

Source: From the authors.

According to the standard proposed by Lawson (2002) composed of a hypothetical-deductive argument, the speeches of students from shifts 4 and 5 demonstrate a logical and abstract structure for the argument that was perceived in the statements that follow in Table 5.

Table 5. Transcription of relevant statements with analysis of the argumentative structure.

Shift	Transcribed speeches	Brief analysis	SL indicators	Detailing the Arguments
4	(Student C) Teacher, ("if") we can plant beans to eat, ("then") so our parents save money.	The linguistic game used responds to the transdisciplinary proposal suggested by the researcher. Arguments: level 04	• Hypothesis survey • Conclusion • Prediction	The child did not complete all the argumentative pattern proposed by Lawson, however the prediction presented in the conclusion makes us realize that the student established a cause/effect relationship within an economic perspective.

				Use of the deductive method.
5	(Student D) Teacher, you can earn money by planting beans, because I see people selling beans at the Market.	The linguistic game presented responds to the researcher's transdisciplinary proposal. Arguments: level 04	• Presentation of extra class information • Justification • Prediction	Use of the inductive method, since the logical reasoning starts from the effect of making money from the sale of beans.

Source: From the authors.

The student of shift 4 does not verbally present a logical reasoning to reach the conclusion "this way our parents save money", however this reasoning can be perceived by the hypothesis presented in the sentence "we can plant beans to eat" which is totally consistent with the transdisciplinary proposal of the linguistic game expressed by the researcher in turn 3.

Although it does not present the use of the five indicators of scientific literacy, the level of its argumentation is 4 since we can identify a coherent logical reasoning and full knowledge of the subject addressed.

In shift 5, the student starts from an empirical knowledge to reach the conclusion that it is possible to earn money by planting beans, since part of the particular experience "I see people selling beans at the fair" to build the general rule. To structure the two ideas explained, logical reasoning is present to explain the idea contained in the conclusion, which leads us to believe that this child is fully aware of the subject to the point of reaching a general rule. The life experience of seeing people selling beans at the fair is also a justification that gives legitimacy to his conclusion.

The abstraction used by the children of turns 4 and 5 when bringing their life experiences to light of their reasoning demonstrates the period of concrete operations proposed by Piaget (ABREU, 2010), because although they manage to operate symbolic representations, they still perform part of this task using the empiricism.

4.2 Written Texts or Drawn Texts

In the small texts written and drawn, we noticed that many children dominated the answers, however they were not anchored under the aegis of the argument.

In the written texts, the fact that students tend to summarize their thoughts, writing only the essence of the proposed linguistic game, was taken into account, since they are still unable to develop a dissertation composition that requires a more refined degree of abstraction, which occurs on a smaller scale when it comes to spoken texts, even though it is the same subject.

As this research studied children who are in the phase described by Piaget as being "preoperative", it was realized that the completeness of the arguments presented in the written linguistic game is implicit,

which made them present in the body of the essay only the expressed objectivity in the result of the experiment (PALANGANA, 2015).

Following it is presented one of the descriptions of the final result of the report that the children made at the end of the bean grain planting experiment. The text in its translated version read: “Science report, we concluded that the grains that were placed in water sprouted and are developing because with the water, light and the heat of the sun grew more, and the beans grown without water do not grow, even after several days and the beans that remained in dark environments do not were ideal for good grain development” - “Relatório de ciências concluímos que os grãos que foi colocado água brotaram estão se desenvolvendo pois a água, luz e o calor do sol cresceram mais e os feijões cultivados sem água não crescem, mesmo após vários dias e os feijões que ficou em ambientes escuro não foram ideais para bom desenvolvimento dos grãos”. Table 6 shows the analysis performed for this written speech.

Table 6. Transcription of the conclusion text of the experiment with analysis of the argumentative structure.

Shift	Transcribed Text	Brief analysis	SL Indicators	Detailing the Arguments
6	We conclude that the grains that were placed in the water sprouted (and) are developing (because) the water, light and the heat of the sun grew more (...) beans grown without water do not grow, even after several days (...) the beans that remained in dark environments were not ideal for good grain development.	Arguments: level 02	□ Explication	The child did not complete all the argumentative pattern proposed by Lawson, however the explanation presented and represented by the element “because” indicates that he relates previous knowledge that supports deductive thinking, establishing a cause/effect relationship within the linguistic game addressed.

Source: From the authors.

Shift 6 is efficient to show that, even if it is a description of the observed event, the element “because” proves the implicit presence of an argument that makes use of previous knowledge about the linguistic game used to deduce the reason why the grains of beans have developed satisfactorily. For this reason, this argumentation is level 02, since it presents part of the logical reasoning proposed by Lawson and full knowledge of the subject discussed within the scope of the linguistic game expected for this age with the study of this content.

However, when referring to the grains that were exposed in a dark environment, the writer was unable to achieve the same perspicacity expressed in the previous event, since deducting the result of an event with opposite characteristics, that is, unfavorable to the previous one, requires a more complex level of abstraction.

Another written text taken from the item “conclusion” of the experiment observation activity is highlighted. On it is written: “With water it grew strong and beautiful. It has large, green leaves. No water did not germinate. Closed with water, it had a fallen stem, a whitish color and small, withered leaves. To grow strong and healthy, plants need land, water and sun. ”- “Com água cresceu forte e bonito. Está com folhas grandes e verdes. Sem água não germinou. Fechada com água ficou com o caule caído, cor esbranquiçada e folhas pequenas e murchas. Para crescer forte e saudável, as plantas precisam de terra, água e sol.”

As this research used the discourse analysis methodology, the text above presents an interesting argument, since it is implicit in the student's knowledge roll, that is, it is at the moment of the effective use of scientific literacy in the observation of a life practical situation, which is the development of a plant, that the language game used by the child expresses the argument, as it states that a plant can only grow strong and healthy if it has the conditions to do so. Examing more closely at the period: “in order to grow strong and healthy, plants need soil, water and sun” it is clear that the student completed the deductive method he used without knowing and, as in Aristotelian logic, he analyzed the called syllogisms, which are typical sentences of subject and predicate with the possibility of the latter affirming and confirming the first. Based on the observed premise that, “with water it grew strong and beautiful. It has large, green leaves. Without water it did not germinate”, the child considers the importance of the water element for the good development of the plant and in the prayers: “Closed with water it had a fallen stem, whitish color and small and withered leaves” expressed the relevance and the influence exerted by the absence of the sun in the result of plant development, which led him to the conclusion that “to grow strong and healthy, plants need soil, water and sun”. Therefore, the analyzed content presents a slightly more sophisticated logical reasoning than the ones previously presented, especially if we take into account the age and the preoperative phase in which the student finds himself, since he develops a descriptive essay with essay elements.

Previous knowledge of the subject is also noticeable, which raises the level of the linguistic game used, since it uses the scientific word “germinated” to describe that particular moment in the experiment. All of this allows us to classify the argument as being level 04. Still, and no less important, it achieved the skills proposed by the Common National Curriculum Base required in Brazil for this content, which was to "investigate the importance of water and light for the maintenance of plant life in general" and "identify the main parts of a plant (root, stem, leaves, flowers and fruits) and the role played by each of them, and to analyze the relationships between plants, the environment and other living beings” (BRASIL, 2010). Table 7 shows the details of the arguments used by the student, demonstrating the pattern proposed by Lawson and the characteristics of scientific literacy found in the analyzed excerpt.

Table 7. Transcription of the conclusion text of the experiment and analysis of the argumentative structure

Shift	Transcribed Text	Brief analysis	SL Indicators	Detailing the Arguments
7	With water it grew strong and beautiful. It has large, green leaves. No water did not germinate. Closed with water, it had a fallen stem, a whitish color and small, withered leaves. To grow strong and healthy, plants need land, water and sun.	Arguments: level 04	Prediction Explication	The child presented the argumentative pattern proposed by Lawson implicitly: (IF) there is water (THEN) the leaves are large and green. (IF) there is no sunlight, (then) the stem falls off and the color is whitish and the leaves are small and withered. (THUS) plants need soil, water and sun to grow strong and healthy.

Source: From the authors.

Some students expressed their understanding of the proposed activity through drawings, since drawings are symbols and these by their very nature carry a deeper meaning, awaken feelings consciously or unconsciously, acting on the individual in a subliminal way. Figure 2 illustrates an example of a drawing, representing the non-verbal text analyzed in this research.

This figure takes into account the linguistic game used by the teacher, who raised the following question: “Do all plants have the same characteristics? How are they different from each other? ”. The proposed linguistic game had the objective of gathering information about the previous knowledge of children in relation to the different types of plants to later make them reflect about the peculiarities in the planting of different plants.



Figure 2. Drawing after the "questions that generate discussion and reflection".

Figure 2 reveals that the child has a perception of the diversity of the plant kingdom and this multiplicity expressed in the drawing reveals part of the knowledge that he has on the subject. Such a design is very pertinent, because the knowledge on the subject is one of the requirements that this research was used to propose the leveling of the logical reasoning of the argument (Table 1) used to discuss all the results of this research.

Conclusion

The construction of the argument offers people the opportunity to articulate information and knowledge in search of explanations and justifications necessary for their point of view to be accepted and validated by the interlocutor. For this, it is necessary for the individual to mobilize a list of ideas that intertwine to elaborate a semantic universe that we call here "language games".

In Brazil, the science classes that are already beginning to take place in early childhood education, even before the child's entry into elementary school, initiate students to scientific thinking, even if it happens in an uncomplicated and very playful way. In this context, scientific literacy begins its journey, being stimulated in its first bases through the construction of concepts and the work with argumentation stimulates this learning, because it stimulates the articulation of all the concepts, memories, experiments and experiences that the child conquered during your life.

This research analyzed the arguments of children who are at the beginning of scientific literacy through didactic sequences that instigate curiosity with the objective that they verbalize arguments and thus have subsidies to find and measure elements of scientific literacy.

Considering the use of practical experiments, together with the analysis of the discourse of children, it was possible elucidate to the teacher who works the scientific literacy process the description of the

argumentation process in students of the second grade of Elementary School. This was done using the levels of the arguments of children, taking into account the structure of the argument and the levels of scientific literacy based on Wittgenstein's studies on the linguistic games. With this study it was possible to conclude that the group of children studied is heterogeneous with regard to the elements of scientific literacy at the time of construction of the arguments. Some children are already able to expose a logical reasoning that is evident when pronouncing their arguments and others, however, still have difficulty regarding the abstraction of the scientific contents used in the proposed linguistic game, which hinders the evolution of the process of expressed scientific literacy in unfounded and incomplete arguments.

In the presented activity, it is evident the importance of the teacher to use the pedagogical activities in the classroom in a directed and structured way, in a way that it is possible to observe in the children's manifestations logical structures (even if precarious) that allow to relate the arguments to the scientific literacy initiated by the students.

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