

BETWEEN FANTASY AND REALITY: THE CONCEPTIONS OF ANTARCTICA ON FIRST YEARS OF MIDDLE SCHOOL

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Introduction

This paper will discuss two main fields of analysis: the importance of fantasy on the construction of scientific knowledge and scientific literacy on the first years of middle school. Our research is inserted on a didactic sequence about the Antarctic continent in which the goal was to recreate, from the preconception of students, the physical, climatological and biological conditions of the Antarctic continent, always discussing the human presence on the continent. Developed on the Pedagogical Center of Federal University of Minas Gerais (CP/UFMG) for a period of six months, this investigation was performed in a class of second year student, ages six to seven years old, of both genders. To evidence the construction of the concept of the Antarctic biome, the analysis was focused on written activities, on drawings made by students during class period, on audiovisual and field book records. To analyze the collected data, we worked with the concepts of creating activity, fantasy and reality by Vigotski (2004) and semiotic analysis of drawings made by students (Piaget, 1973).

Teaching Science on the first years of middle school: challenges and possibilities

Appleton (2008) points out that Education in Science of Nature (ECN) on first years of middle school is a relatively recent curricular innovation, starting decades after the end of World War II. The investments in curricular innovation in science occurred, mainly, on the United States, motivated by the bitter defeat of the space race to the Soviet Union, specially after the launch of the Sputnik satellite, in 1957. For americans, this fact signaled the need of investments in science education in order to, consequently, form scientists.

Regardless, the research about scientific education in first years of middle school is most recent than scientific education itself. Reflexes of the uncertainties and controversies of this field materialized themselves at school, in the teacher's formation and in the teaching of science through questionings like: how to teach nature science at this educational stage? What importance

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this “scientific initiation” has in this stage of a child’s development? What are the consequences to the teaching-learning process and to the socialization at school?

There are authors, for example, who question the necessity of scientific education during the first years. This would be the moment to alphabetize the child and to teach it basic mathematical notions. Besides supporting themselves in curricular and temporal restrictions, these authors believe that the child supposedly does not yet have cognitive maturation to learn science. Roychoudhury (2012), for example, argues that teaching science to children is an extremely complex activity, since it requires the teacher to be able to introduce its students to scientific culture, that is, that they appropriate of specific ways of thinking science that involve observation, pattern recognition and its implications, and also develop conceptual models.

Fumagalli (1988), however, incisively defends the teaching of science in first years of middle school. The author bases her thesis in three main arguments: the children’s right to learn science; the duty of the educational institutions in teaching this discipline; the social value of scientific knowledge. To her, the children could be not only the future of society, but the present as well. In light of this, the children shouldn’t adopt a passive posture on the teaching-learning process, but an active-responsive one with full capacities to contribute and to act in the different social and cultural realities that they are inserted, within the possibilities of their ages and development.

However, we are still left with one question: what scientific contents and attitudes can children learn?

The Itinerant Museum Ponto UFMG, an extension project of Pedagogical Center of the Federal University of Minas Gerais (CP/UFMG), drafted and implemented activities which should adequate the programmed contents planned for the Science Differentiated Work Group (GTD) to a semiotic and dynamic approach for second year students. The select theme for the first semester of 2015 was “Knowing the Antarctic continent”.

We sought, over the activities of the GTD, an approach that removed the student from a viewer perspective and transferred it to a place of experimentation and practical dialog with the knowledge acquired during the activities, a protagonist perspective. Therefore, it was proposed that student should create drawings and images that represented its comprehension about Antarctica. It is about these works made by the students, their analysis and transformation, that we will discuss in this text.

The Itinerant Museum Ponto UFMG

The Itinerant Museum Ponto UFMG project began to be imagined in 2006, at the Pedagogical Center of UFMG. Adapted in a mobile unit (truck), the Museum is made up of six interactive rooms that address science and technology themes, they are: uterus, senses, biomes, 3D projection, submarine and cities room. One of the biggest challenges of the project is to ally art, science and education in order to create special rooms that provide aesthetics and unseen scientific experiences for the visitants.

GTD Configuration

The theme “Antarctica” was defined for the GTD activities, based on a dialog established with Professor Andres Zarankin, author of anthropological and archaeological researches on the arctic territory and curator for the Antarctic biome present on the “biomes room” of the Itinerant Museum Ponto UFMG.

According with the National Curricular Parameters of Science, the teaching institution shouldn't disregard the knowledge that students have when they arrive at the school environment, the teacher should act as a mediator, helping the subject not only understand the established curricular content, but also in the perception of the physical environment that surrounds it and with the awareness of the importance of its role as a citizen. After all:

The obtaining answers sources for and knowledge about the world range from the domestic environment and regional culture, to the media and mass culture. Therefore the children arrive at school having a repertoire of representations and explications for reality. It's important that such representations find on the classroom a place for manifestations, because, beyond constituting an important factor on learning process, they may be enlarged, transformed and systematized with teacher's mediation. It is the school's and teacher's duty to stimulate the students to ask and seek answers about human life, about environmental and technological resources that are part of everyday life or that are distant in time and space (BRASIL, 1998c, p.45).

The Differentiated Work Group – GTD came to be exactly to corroborate this idea, allowing the student to show its previous knowledge and, posteriorly, to have freedom and autonomy to analyze its previous conceptions about the proposed learning. The GTD “Knowing the Antarctic continent” was ministered by teachers Rafael Almeida, Lara Poenaru and Itinerant Museum scholarship workers Geysiane Guimarães and Lucas Sangi.

Semiotics and education

Considering that the drawing is the child's language and an expressive manifestation of this subject, this study appropriates of science classes to find the knowledge developed through imagery representations. The drawing allowed the student to manifest the hypotheses that it formulated from its experiences and, subsequently compare analytically its previous conceptions with the new concepts acquired during the semester.

Using drawing as an iconic semiotic element, it is made primarily necessary the elucidation of the semiotic concept. According Santaella, one of the main promoters of the thought of Charles Peirce: "Semiotics is the science whose research objects are all possible languages, which aims to examine the whole of constitution modes and any phenomenon as a significant production and meaning phenomenon." (SANTAELLA, 1985, p.05)

The clearly semiotic approach applied on GTD “Getting to know Antarctica” is based on the educational concepts already proposed by Vygotsky “The first form of relationship between imagination and reality consists in the fact that all of imagination's work are built always from elements of reality present in person's previous experiences”. (VYGOTSKY, 2009. p.20). The students associated Antarctica to images from the imagination's universe, but behind this

association there is real previous knowledge, that many times the student itself ignored: this knowledge should be “unearthed” by the teacher.

The representation through icons is one way of measuring the student's knowledge level about a determined theme, and starting from this analysis, structure the activities in order to awaken interest and curiosity on the student.

Teaching-learning mediated by drawings

For the teaching-learning relationship to be constructed in a satisfactory way, it is necessary to find a balance point which is the association between various teaching ways aiming for an educational model more consistent with everyday society.

The students feel almost instantly attracted by activities that cover elements different than those showed everyday on classroom. That was the case of the class ministered through drawings, the students began to compare their works and critically analyze them as a group, but none of these activities are carried out as an obligation or requirement, this dialog naturally appears. The comparisons and criticisms are ways of affirming themselves as subjects able to create and, at the same time, evaluate themselves and others.

Antarctica and the science education

During middle school, science education covers both biological and geographical aspects; the theme referent to Antarctica dialogs directly with both these contents. It is perceptible that the antarctic continent isn't a territory featured representatively on geography classes, so it is important to show it to students in a differentiated and attractive way.

Perhaps exactly for the cited reasons, such as knowledge about the theme and the consequent combination of legendary and fantastic elements to the educational content, the students have for Antarctica, a curiosity that is not perceived in the case of other subjects. From this perspective, we seek an approach that allows the students access to an unknown content by a big part of class through a logic that intermingles artistic and conceptual elements.

Getting to know Antarctica

The GTD activities started through information collection realized by way of having the students create elaborated designs starting from questions and directions that addressed both the physical and the biological aspects of the Arctic continent. In the first module, we sought to conduct a survey of hypotheses through questions: “What you think when you hear the word Antarctic?” and “Who lives there?” The students' answers served as input for the formulation of practical and subsequential activities.

It was noted that, on first two months of the project, the students' conceptions about Antarctica were permeated by fantastical elements correlated with imagination and fantasy, represented by drawings of penguins riding bicycles¹ and bears with crab claws for paws². Some imagetic elements were also found, which fused other previous experiences of the students with fantastical elements, mainly represented by characters from childrens' movies such as "Ice Age" and "Happy Feet".

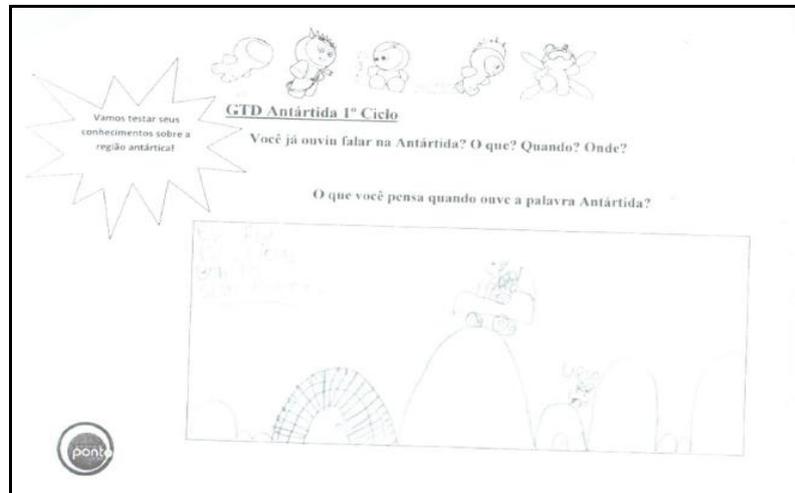


Fig. 1:

In view of the conception of Antarctic presented by the media, it was expected that the students appropriated of fantastic images to represent something unknown by them. According Vygotsky:

(..) La imaginación, como base de toda actividad creadora, se manifiesta por igual en todos los aspectos de la vida cultural posibilitando la creación artística, científica y técnica. En este sentido, absolutamente todo lo que nos rodea y ha sido creado por la mano del hombre, todo el mundo de la cultura, a diferencia del mundo de la naturaleza, todo ello es producto de la imaginación." (1990, p.10)

Therefore, children tend to represent the unknown according to the conceptions acquired through mediatic, mythical and cultural elements. On GTD, the employed methodology was, exactly, to use the drawings as a way to establish a link between the initial conception of the Antarctic and the knowledge worked during the lessons and activities, instead of disqualifying the first impression that the students had on the issue.

When compared, the students' drawings made on first two months of research with the drawings made on the last month, evidenced the transition process from fantasy to reality. This process started with scientific documentaries about Antarctica, book readings and discussions in the classroom and was shown in the drawings by the representation of other elements that were not previously present, like a scientific base, ships and typical human buildings. We noticed, therefore, an increase in the creative repertoire and consequently in the creative activity of the children, as the subjects of the research appropriated of elements present in the teaching resources worked.

Drawing Antarctica

On the second activities module, the students were asked about means of transport that could be used to travel to Antarctica. A considerable part of students suggested bus as a mean of transport, others students suggest airplanes and even a rocket (see pictures below).

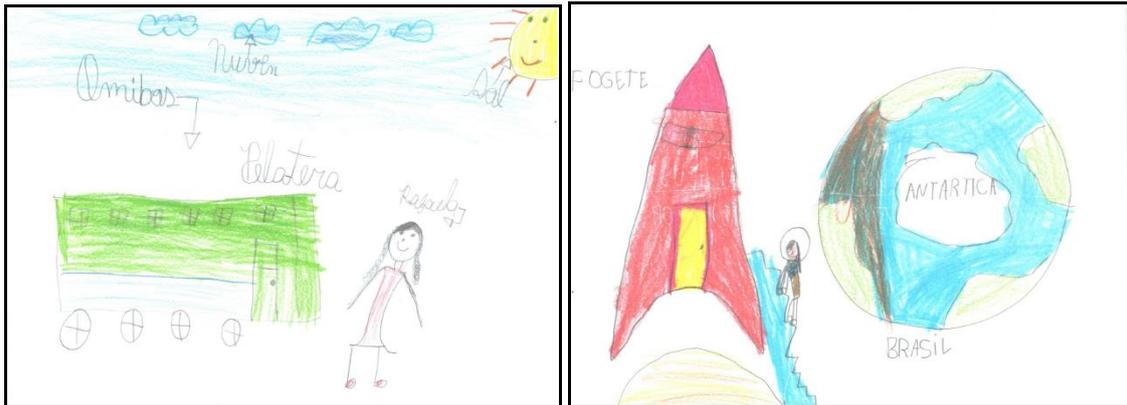


Fig. 2:

We believe that many children initially suggested bus because that is a more present mean of transportation on their daily lives, many times the only way that they have to go to school. The rocket would be something imaginary, a transportation more sophisticated that a trip to a distant region would require; this vehicle is represented in the media, especially in cartoons, as a mean for rapid transportation, fun, safe and has the ability to land on any surface and in different situations. Few students presented the aircraft as a means of efficient transport. It was found, through conversations during the activity, that few students had ever traveled or had ever gotten to know an airplane.

This activity made it visible that the child's imagination is a fundamental tool to construct, through its own perspective of childhood, a concept about the environment that surrounds it. According to Natividade:

The proximity between the produced drawings, life context and everyday relationships established by the child is theoretically confirmed, both in relation to the conception of the constitution of the subject, but also about the child's drawing process. According to the historical-cultural approach in psychology, the subject constitutes itself from the social relations and actively signifies the reality in the struggle with multiple meanings produced on the context in which it actively participates. (NATIVIDADE, 2008, p.5)

Corroborating this idea, we affirm that imagination associated with life experience, contributes in an expressive way to the signification of the world by the child.

Second analysis

Considered an expert teaching tool, the drawing aims to contribute, along with teacher, on the student's teaching-learning process also helping on a meaningful way to the development of writing skills.

After the reading of small texts, exhibition of documentaries and discussions, the students showed a significative transformation in relation to the representation through drawings. It is worth mentioning that during no time of the classes, the teachers made any direct interference on the elaboration process of the imagetic representations.

Below are attached drawings by three GTD participants that outline a new perspective and conception about Antarctic.

Its possible to notice when analyzing these images that the students represent Antarctica with a more realistic perspective. It was noticed the previously presented concepts on first drawings are gradually deconstructed during activities. Some elements and specific characteristics of arctic environment such as time, home (igloo), animal presence and habits for food acquisition are in the drawings.

The role of the educator

The educator participates in the learning chain not as the supreme holder of an absolute knowledge, but as someone able to mediate the student-knowledge relationship in order to make the activities more affective and assertive. The teacher is the individual responsible for giving the student material for the construction of knowledge and not an infinity of finalized and closed subjects.

To be a mediator of knowledge also implies on being an analyst. It is the role of the educator to see if the student has assimilated the contents properly, and otherwise find which learning step can be reformulated bearing in mind the improving of the educational process.

Final considerations

In the study presented here, we sought to highlight the importance of the drawing element in the learning of the programmed content. The theme "Antarctica", previously considered unlikely to be studied and questioned by first cycle students, became an adaptable content to this age group. This adaption was possible through planning, discussion and approaches in which semiotics was present.

The students learned more and more easily having started the process from their own concepts, even if mediatic or fantastic, towards a discourse closer to reality presented in the GTD activities. We believe that, otherwise, students might have felt bored or uninterested in the subject.

Allowing the individual to have autonomy to build and develop their own knowledge, even if in a directed way, is an action that requires the establishment of a link between life experience, culture and learning. This connection provides the student, means to set itself up as a critical and aware of their social-cultural role subject.

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