https://dx.doi.org/10.22161/ijaers.74.58 *ISSN: 2349-6495(P) | 2456-1908(O)*

Breaking Walls, Trailing Knowledge: A Field Class for Scientific Literacy at Mochuara Natural Park

Jose Ramos de Souza[1], Carlos Roberto Pires Campos[2]

[1]Programa de Mestrado em Ensino de Humanidades, Instituto Federal do Espírito Santo, Brazil
[2]Programa de Mestrado em Ensino de Ciências, Chemistry Department of Instituto Federal do Espírito Santo, Brazil

Abstract*— *One of the challenges of science education in the XXI century points to the creation of strategies that favor learnings not often promoted in formal education. In this paper, we present the results of a participatory pedagogical practice that culminated with a field class at the Mochuara Natural Municipal Park in Cariacica/ES, highlighting its contributions to the advances of students' scientific literacy. This is a qualitative research, a school intervention research (Lüdke; André, 1986), whose data were collected through videos, portfolios, questionnaires and field diary, interpreted in the light of scientific literacy indicators (Sasseron; Carvalho, 2008). The results showed that the activity stimulated the information organization capacity, the hypotheses formulation about the results of anthropic actions in the environment, the deepening of science concepts and the improvement of the students' interpersonal relationships.

Keywords*— *Field classes, Non formal educational setting, Scientific literacy, Mochuara Natural Park.

I. INTRODUCTION

Technological advances, instant access to information and the emergence of new equipment have imposed a rapid pace of change on humanity, demanding from people a continuous qualification process, in search of new skills, qualification, knowledge and mastery of techniques. In this sense, proceeding to read the world critically from the contribution of scientific literacy is fundamental so that one can know, and recognize oneself, as a social actor, in the living space and, from there, strengthen the exercise of citizenship, participating in debates on controversial topics that concern to their lives.

The field class in a non-formal educational setting can assist in the construction of knowledge about the space and in the knowledge re-elaboration. We do not advocate that these non formal spaces should replace the school, but it is the school, by using field classes, proposing direct contacts with the environment, that will make possible for the student to develop other skills, such as to observe and to analyze landscapes, to formulate hypotheses about the anthropic impacts, to research how rock outcrops are formed and, didactically, to bring theory learned in school to be practiced together.

According to Rodrigues and Otaviano (2001), fieldwork encompasses the meaning of a method, because it is a conscious pathway or procedure, rationally organized, with the purpose of making work easier, and more productive, to reach a certain goal. As a methodology, for Campos (2012), the field class allows the student to gain protagonism and to become a creative actor in his learning. As Morin (2014) argues, a fragmented, compartmentalized and reductionist intelligence "breaks the complex of the world into disjoint fragments, breaks down problems, separates what is united, makes the multidimensional one-dimensional" (Morin, 2014, p. 43). The field class, in this sense, contributes to develop a view of the environment in its systemic aspect, encouraging the participants to develop views from a certain point, acting critically in the reading of the place. They may, for example, question the differences between environmental impact and environmental degradation, in a field class, in a meander of a silted river.

Gadotti (2003) draws attention by stating that today there is no longer any sense in the existence of a professional who is limited to reproducing the knowledge and culture that others have developed. The teacher today needs to be a professional capable of creating knowledge. Sepini and Maciel (2018) corroborate this discussion by stating that:

https://dx.doi.org/10.22161/ijaers.74.58 *ISSN: 2349-6495(P) | 2456-1908(O)*

> "To fill part of the existing gaps, and to believe that for changes to occur in the attitudinal conceptions of future teachers, they need to be involved in situations that allow reflection on their teaching and learning activities, which cannot be restricted just using textbooks, it is necessary to work on other didactic resources involving real and concrete themes in the classroom "(Sepini; Maciel, 2018, p. 79).

If there is a pedagogical methodology that favors the study of real themes, this is the field class, which provides the construction of human autonomy. In the field, students can relate themselves to a large number of environmental, physical and social phenomena that they still do not understand. The field, as an educational space, with high complexity of analysis, requires a well-prepared teacher, with the ability to establish mediation from the various instruments and signs present in the environment, organizing this knowledge, so that the subject has the possibility to transform the concrete in abstract background.

Faced with these challenges and with creative ideas, we decided to develop a participatory pedagogical intervention in the Mochuara Municipal Natural Park in Cariacica - ES, Brazil, highlighting how the field class in this space contributes to promote advances in students' scientific literacy. The choice of this non-formal, non-institutionalized educational setting (Jacobucci, 2008), resulted from the various possibilities of approaches on interdisciplinary themes that it offers.

II. THEORETICAL BASES

In the history of mankind, man sought to build technologies that could improve his quality of life. Thus, it aimed to solve the problems that affected him, through various experiences and inventions, contributing for these "discoveries" to be democratized, being able to be freely accessed by people (Chassot, 2016, p. 82).

It so happens that in the current historical context, access to science and to the technological goods produced are in few hands. Science has been imprisoned in laboratories, in academia, or by large corporations. People experience knowledge is no longer taken into account, or is embedded and sold at exuberant prices (Chassot, 2016, p. 74).

Assuming as a task the reinvention of the proposals for a liberating education in the field of scientific literacy, we realize the need to democratize, and bring science to the center of the debate, understanding it as a human construct, because it is produced by men and women. Science has to occupy a central place in the struggle arena, in order to become a liberation tool.

Science teaching contemplated in the National Curriculum Guidelines demands thinking about a teaching proposal that is based on scientific literacy, in order to form critical citizens, who seek their emancipation. Literacy for citizenship means embracing the conception that education and science are always a human process (Chassot, 2003), constituted by them and for them destined. Because it is a human construction, science consists in an attempt to explain its understanding of the reality.

Chassot's (2003) defends that one should demystify science as a pure truth, without historical, social, political, economic influences. The author seeks to remove from science the outline as if it were a dogma, defending to be necessary to discuss the human aspects present in the constitution of the scientific knowledge and its purpose, which is why it does not have the status of absolute and unquestionable knowledge.

Morin (2016) contributes to this discussion when he presents the human being as a complex, unique being, but, at the same time, full of possibilities, capable of building scientific knowledge that leads to the improvement of people's lives, as well as using this knowledge for dehumanization.

Science, as a human construction, can be considered a language to explain our natural world (Chassot, 2003). Therefore, as science is a language, it can be interpreted in the most diverse ways, constructing readings of reality and, above all, providing opportunities for re-readings and recreation of scientific knowledge.

As a language, scientific knowledge, from Freire's perspective, cannot be socialized as a simple transmission of information, since man needs to have a position before the world and its problems. Reis, Moreira and Silva (2019) participate in this discussion by stating how they understand the educational process:

> We understand from a Freirean perspective in which literacy implies the development of a critical conscience in order to overcome naive conceptions about the world. That is, literacy is not based simply on the technical dimension of the concepts, but on their interrelation with the different aspects of society (Reis; Moreira; Silva, 2019 p. 211).

https://dx.doi.org/10.22161/ijaers.74.58 ISSN: 2349-6495(P) | 2456-1908(O)

Morin (2014) draws attention to the scientific language which, by denying to communicate and to democratize scientific knowledge, becomes harmful. The author criticizes fragmented knowledge, with no links between the parts and the whole, and the whole without the parts. The author suggests us that there was a very strong rupture between the different types of knowledge, in this context, scientific knowledge seeks to assume itself as truth, breaking the dialogue with other areas of knowledge. Thus, what should be a challenging environment, which values creativity, ends up becoming a standardizing space, indifferent to the context and the process. Losing the ability to promote a great dialogue between knowledge, on the contrary, the school builds walls and boundaries between the disciplines that, isolated, are not able to produce scientific knowledge that explains the totality and excludes those who cannot read its language.

Freire (2001) states that the contents cannot be pieces of a reality, disconnected from the totality. It is necessary that, when proposing a teaching on a certain theme, students should be able to build a significant dimension of their reality, which allows a critical analysis of the interaction of all its parts, being able to know the totality.

So here we come to the proposal of a humanistic science. We defend the teaching of a science that privileges life, that has an ethical conscience with important guidelines such as: the environment defense, the improvement of quality of education and research, and the accessibility by the great public to technologies. Finally, we defend a science that is an expression of a creative work of men and women.

We ended this session with Sasseron and Carvalho (2003) who, when dealing with scientific literacy, propose some structuring axes, which help us to understand the scientific literacy meaning, summarized in three axes, namely:

- scientific literacy helps us to understand basic scientific terms, knowledge and concepts in a basic way;

- scientific literacy helps us to understand the nature of science and the ethical and political factors that surround its practice;

- scientific literacy helps us to understand the existing relationships between Science, technology, society and the environment.

Scientific Literacy would therefore be the set of knowledge that helps citizens to play their social roles, among which, undertake a reading of the world, transform the world, making it a better place to live and learn to make decisions regarding to science and technology, which directly affect their life. Skills like these value science education and science itself, recognizing it as a tool to understand something about the world around us. This achievement involves understanding the complex, rather than harmonic, relationships between man and the environment, with a view to respecting the environment limitations and man's role in the responsible use of natural resources.

III. METHODOLOGICAL PATHWAY

This study adopted the Qualitative Research Approach. This paradigm was appropriate because there was a social-historical problem to be discussed which demanded to be understood in details. So an analysis of a school learning situation was analyzed. In this sense, Chizzotti (2001) claims that the qualitative approach configure itself as a methodology that shows the relationship between the individual and the social context in which it is inserted, in a process of continuous knowledge and discoveries, which helps to interpret the most diverse phenomena, understanding their perspectives.

Our study sought to produce data and observe the social and pedagogical phenomenon in a learning situation, and to discuss innovative proposals within the studied theme. The data were collected from the subjects' performance during the research. As our study configures itself as an education research, there is a great difficulty for the collected data to be measured statistically, which is why we opted for a qualitative approach, whose focus is on the process, not on the product.

We used, in the study, some instruments and techniques that made it possible to collect data during the research stages, which were divided into pre-field, field and post-field. Table 1 contains a summary of the data collection instruments that were used, associated with the research context.

https://dx.doi.org/10.22161/ijaers.74.58 *ISSN: 2349-6495(P) | 2456-1908(O)*

Tablet 1: Data collection instruments

TECHNICS	INSTRUMENTS	GOALS	RESEARCH MOMENTS
Participant observation	logbook	Organize and systematize data collection.	Pre-Field Field Post-Field
Video recording and Photograph production.	Filming and Photographic camera	Register the dialog of students and their moments of research.	Pre-Field Field Post-Field
Roadmap with tasks to be held at Mochuara Park.	logbooks	Build knowledge related to Mochuara Park.	Field Post-Field
Production of drawings and written report registration	Illustrated portfolio	Provide a moment of reflection.	Post-Field
Data survey	Quiz	Apply questionnaire	Post-Field

Source: Elaborated by the author (2018)

Data produced in the pre-field, field and post-field were analyzed in the light of our theoretical framework, based on the scientific literacy indicators proposed by Sasseron and Carvalho (2008), didactically reorganized by Leonor (2013). When analyzing the data, we seek to assess whether the objectives of this research were achieved and to what extent students were able to construct a critical reading of the world.

3.1 Research context

We seek to carry out our pedagogical practice by dividing the work into stages, as proposed by Campos (2012), which are subdivided into: "pre-field", "field" and "post-field", described below:

Stage I: The "pre-field", counted on 4 introductory theoretical modules and two workshops, one on photographs and one of Georeferencing, involving a total of 15 classes of fifty minutes (between 06/19/2018 and 10 / 07/2018), in the school multimedia room. The activities developed in this stage included: dialogued classes, group activities, slide show with satellite images referring to the place/object of study, reading and discussion about the legend of the Fire bird, photography workshop, Georeferencing workshop and guidelines for procedures and use of instruments during the field class.

Stage II: The "field", held at the Mochuara Municipal Natural Park located in the city of Cariacica – ES, Brazil, 10 km away from the school, started at 7 am on 07/11/2018 and ended at 12 noon, on the same day. In this stage, the students were guided through four points, entitled: Pedra da Cabana, Clareira da Árvore, Nascente da Pedra and Paredão, in which the planned pedagogical interventions took place. In this step, data collection occurred through participant observation (with records in the logbook), video recording (videographic filming and transcriptions), photography (photos with the record of the moments of the field class) and filling in the oriented observation grid.

Stage III: The "post-field" was held at the school spaces, between 07/12/2018 and 07/13/2018, when we shared the results of the "pre-field" and "field" stage. In this moment, the students had a conversation about the experiences in the field, made drawings about the experience with the field activity and answered an individual questionnaire. Data collection took place based on the technique of producing drawings and choosing a photograph that was significant for the students, which would be exhibited at the Annual School Cultural Fair.

3.2 Mochuara Park characterization

The Mochuara Municipal Natural Park was created by Decree n. 031, of April 17, 2007, covering the areas of the Mount Mochuara granite massif, in a total perimeter of 9,390 linear meters and an area of 436.18 hectares, which represents 1.52 % of the total area of the Cariacica municipality, Brazil (Cariacica, 2017).

The Park does not have a regularized land situation, which is why it is not surrounded; nor does it have milestones identifying its limits. The Park is classified as a Conservation Unit, due to its special characteristics, but it does not have a permanent technical team and inspection occurs only when complaints are made. Although the CU has the characteristic of safeguarding, the representativeness of ecologically viable portions of different populations, habitats and ecosystems, the government has done little to protect it. As an example, the park has a headquarters, which has currently been used to treat drug addicts. There are trails that appeared spontaneously, but do not have interpretive signs to promote environmental education or science education. The fact is that the park has no infrastructure to receive visitors, it does not have a management plan and the management council is inactive.

https://dx.doi.org/10.22161/ijaers.74.58 *ISSN: 2349-6495(P) | 2456-1908(O)*

Based on the studies carried out by the company FEMAS (2012), with a view to preparing the preliminary diagnosis for the construction of the Management Plan for the Mochuara Municipal Natural Park, the geological framework present in the park has granites, gneisses and also alluvial deposits. It is a rich region in water courses, since there are several springs and streams, the main ones are: Roda d'Água stream, Boca do Mato stream, Montanha stream, Bubu river, Tanque stream and Duas Bocas river. The fauna present in the park's territory contains ichthyofauna, hepertofauna and avifauna elements.

Regarding to vegetation, there is the predominance of macaque, a plant type resulting from the cessation of agricultural activities or reduction of its management, especially in old pastures, where natural regeneration develops an herbaceous-shrub vegetation with a strong presence of exotic species such as colonization grass (*Megathyrsus maximus*), sweet grass (*Melinis minutiflora*) and native plants considered weeds (Femas, 2012).

The Secondary Forest, in an advanced regeneration stage, with long periods of time or in places with better edaphic conditions, develops a forest-sized vegetation with closed physiognomy (canopy around 10m and emergent up to 20m), with the presence of sub-structured forest and greater diversity of life forms, such as epiphytes (*Billbergia zebrina*) and woody lianas.

Diagnostic studies for the construction of the management plan for the Mochuara Municipal Park classified the existence of a floristic list consisting of 406 species, distributed in 112 families, with the greatest wealth being Fabaceae (35 species), Myrtaceae (26), Rubiaceae (22), Melastomataceae (19), Poaceae (13), Malvaceae (12), Piperaceae (12), Arecaceae (11), Euphorbiaceae (10), Lauraceae and Bromeliaceae (9 species each).

The Mochuara Park region is home to important economic and cultural activities, in which occur the congo bands performances and the congo carnival, the only cultural event of this kind in Brazil, also attended by Bananeira John, the city's folklore from Cariacica.

According to data from the Municipality of Cariacica - ES (2017), in the region of Mochuara Park, several agrotourism activities are developed, covering 11 properties and three more productive activities, which make up the rural tourism circuit, namely: Bica do Luiz, Cocos Village, São Sebastião Farm, Terra Santa Farm, Roças Velhas Farm, Wind Mirante, Recanto dos Sauís, Recanto da Lagoa, Sítio Beija-Flor, Sítio Colírio and Estância Vale do Moxuara, which offer a variety of activities such as ecotourism, leisure, among others.

3.3 The school

The State School of Elementary and Secondary Education Néa Salles Nunes Pereira, chosen for the application of The Teaching Practice, is located at Rua 11, s / n, Bairro Maracanã, Cariacica - ES, Brazil, was founded in 2000, as a result of the popular organized movement struggles in the region where it is located. This school was chosen because it is closely linked to our history experience to improve life quality of the population of the Maracanã neighborhood and region, and for having worked as a teacher and member of the School Council. Theses reasons justify the choice for this school.

3.4 Research subjects

Participated in the pedagogical intervention 23 students regularly enrolled in the 1st year of High School of the school morning shift. The choice of this class was based on the recommendation of the Headmaster who welcomed the development of the research, by the approximation of the curricular contents of Geography, which are being applied in the context of the classroom and this could be the the possibility for them to be deepened with the realization of the field class. In addition, there was a need for a pedagogical activity that could unify the class, which was considered dispersed and undisciplined. The Common Basic Curriculum for State Schools, which for this year uses procedures that combine data and information from different fields of scientific knowledge, to understand, explain and represent local and global phenomena, facts and processes also corroborated for our choice.

IV. RESULTS AND DISCUSSIONS

According to Sasseron and Carvalho (2008), students can develop scientific literacy when in contact with the environment, so they can can progress skills associated with the scientist's work. These skills can be analyzed by using scientific literacy indicators. In this way, we expanded the research with a view directed to the construction of a learning that would allow the students a critical reading of the world, in order to enlarge their scientific literacy.

Based on the assumptions of teaching for scientific literacy (Saseron; Carvalho, 2008), Leonor (2013) developed a pedagogical analysis of the data collected in her study with elementary school students from a municipal school in Vitória (ES), Brazil, through the selection of the following SL (Scientific literacy) indicators, as analysis categories: (1) organization of information; (2) hypothesis survey; (3) nature of science;

https://dx.doi.org/10.22161/ijaers.74.58 *ISSN: 2349-6495(P) | 2456-1908(O)*

(4) science content; (5) impacts of technology and science on society; (6) social practice. These categories were pedagogically adapted from Sasseron and Carvalho (2008).

In this sense, we will use such indicators to express the student's performance type and relationships with the pedagogical process, revealing his perception, attributes or attitudes when facing the scientific challenges. The proposal was to lead students to a practice in which they could behave like scientists in the field.

During the Pre-Field stage, when asking students what is science? And who does science? we received the following responses, which will be analyzed in the light of our theoretical framework.

> Student 1: "How we were thinking, right. Like science was a thing for people, like genius, that we needed to understand and follow everything that science sent."
>
> Student 2: "For me it is the study of nature, the human body, the type of discoveries of cures. Like, those things made in the laboratory."
>
> Student 3: I think it's like studying to improve people's lives; to create new things. Invent different things. Anyway change the world for the better."
>
> Student 4: "For me, science is a scientist thing, people who have studied a lot, NASA astronauts, those people who wear lab coats and work in laboratories, university professors."

Analyzing the students' responses to the question raised, we can perceive an appreciation of science. Their vision points out to a faraway science, distant from their reality, for them, it appears as a science made by people with superior knowledge, capable of intervening in reality, as an immutable truth. From the students' statements, we can infer that the school is not understood as place where is possible to produce science and knowledge. In the same way, we can conclude that scientific practice is configured as a skill for a few, which it is not available to high school students. There is also, in the students' point of view, an empowerment of science, as if it were pure, neutral and capable of changing, alone, the destiny of people.

Based on these discussions, Chassot (2016) understands Science as a language that facilitates our understanding of things in the world. At the same time, he opposes the scientism that often takes place in classroom debates and even in universities. This exaggerated belief in the power of science and its "always" beneficial effects does not build criticality in school actors, as well as in the general public. Positioning oneself before the science effects and questioning its power is part of the scientific literacy process, which seeks to lead social actors to understand that science knowledge is a part of the human being construction, therefore, it's fallible.

As a result, science education needs to rescue that, since the beginning of human history, man has sought to build several technologies that could provide him with a better life quality. During several phases, he sought to solve problems that would affect him, through experiments, inventions, contributing for these "discoveries" to be democratized.

To carry out the fieldwork, students should choose a space on the trail and outline with string, measuring tape and barbecue stick, a 2m x 2m quadrant for the activities they should perform. The groups' first step would be to identify the living beings and abiotic elements present, in addition to indicating the presence of anthropic actions and whether there were water courses at the limits of the quadrant.

Sasseron and Carvalho (2008) highlight that the Organization of Information category refers to the moments when it is discussed about the way a work has carried out. This indicator can be identified when the students tried to show an arrangement for new or previously listed information. For this reason, this indicator can arise both at the beginning of a job and in the resumption of an issue. This ability was observed during the activities, when, in the field, the students presented that the composition of the living elements of the quadrant contained, in addition to animals, plants and seeds. The students were able to separate this material and categorize it. In Figure 1, we identified that there was a concern about the information being selected and aligned with the activity proposal: among the notes of the students, in the field diary, there was "a flying insect, a snail's bark, a caterpillar, a butterfly, a dry leaves, there are yard plants, small dry branches, there are no trees". By listing the inhabitants of the park's ecosystem, students learn to understand its dynamics and their own relationships with the environment.

https://dx.doi.org/10.22161/ijaers.74.58 ISSN: 2349-6495(P) | 2456-1908(O)

Fig. 1: Work group carrying out activities based on the field script

We observed, during the activity, that the students were deeply involved with the work they were supposed to do, which materialized itself in the seriousness of assigning answers to the demands and collecting the information and data they were registering in the field diary, from the field script. The activity was not mechanically performed, such as simply filling out a script. There was a lot of discussion among the students with the use of several arguments, which demonstrated that they were, in fact, involved with the pedagogical proposal, acting as active subjects of their learning. In this sense, Freire (2016, p. 105) interprets this pedagogical action as a look at the world that is not "something that is spoken with false words, but the mediator of the subjects of education, the incidence of the transforming action of men, that results in their humanization". Vigotski (2016) attributes fundamental emphasis to the role of learning mediator that should be exercised by the teacher or a more experienced colleague. According to the author, these culturally given forms will be throughout the development process, internalized by the individual and will constitute the symbolic material that will mediate between the subject and the knowledge object (Vigotski, 2016).

When we asked to the students "if human beings fail, can science fail? Why?" Most responses pointed out that science can fail. We present an episode when a student answered to this question like this: "You can make mistakes, because, science is made by man and the human being is subject to make mistakes."

The student's response can be corroborated by Chassot (2016), for whom science is not enclosed in a bubble, invulnerable to the events around it, therefore, it is not neutral and free from flaws or ideological use. Since scientific knowledge is a human work and because men are inserted in a given society - with its cultural, political, historical, economic models, etc -, they bring to Science their conceptions, beliefs and desires.

According to Chassot (2016), we can understand the nature of Science as a set of elements that deal with the construction, establishment and organization of scientific knowledge. This can range from internal issues, such as scientific method and the relationship between experiment and theory, to external ones, such as social, cultural, religious and political elements influence on the acceptance, or rejection, of scientific ideas.

Freire (2016) understands science must establish a dialogue, a meeting of men mediatized by the world, to pronounce it; Chassot (2016) defends that science is a language to facilitate our reading of the world. Therefore, since science is a language, a dialogue between man and the world is essential and this dialogue could be opened for everyone to participate in. For this reason, Freire (2016) advocates a science as a human socio-historical creation, given the fact that historicity is present in all knowledge. As rigor is not born suddenly - it is forged in history - it demands a pedagogical practice in whose intimacy there will be a glimpse of the possibility of overcoming a previous naive procedure.

Moving forward in our reflection, we see, in Figure 2, a student drawing who aimed to establish a connection between a legend related to The Mochuara and Mestre Álvaro Mount: the Fire Bird legend. This demonstrates the presence of an indicator of scientific literacy which is the hypothesis formulation that the student raised, allowing us to realize that he understood the way the tribesmen that inhabited that area in pre-colonial times interpreted a possible crossing meteor seen in between the mounts. That event was, afterwards, turned into a legend.

https://dx.doi.org/10.22161/ijaers.74.58 ISSN: 2349-6495(P) | 2456-1908(O)

Fig. 2: Mount Mochuara drawing highlighting the "fire bird"

The image reveals many scientific literacy indicators: "hypothesis survey", "information organization", "social and science practice". The student was able to articulate a theme worked in the pre-field stage with his vision, in the field activity "Now I understand the legend of Mochuara and Mestre Álvaro, because they face each other". This student seeks to articulate other scientific knowledge by conceiving, in his drawing, the hypothesis that indigenous peoples, in the past, saw a meteor cutting through the sky and took it as if it were a fire bird. In this sense, the student would be deserting a common sense explanation to reach a scientific basis one.

In our study, we chose to analyze students' perceptions of science and technology impacts on our daily activities. In the field stage, when we arrived at the place called "Paredão do Mirante", the students were able to observe the landscape, from which several questions arose. We chose an episode that shows the negative impact of science and technology on the development of the Cariacica city. When asked: "Did you know that Cariacica had a port in the past?" Several debates and hypotheses emerged, among which we chose the one that helps us to reach our discussion objective. Student 2 seeks to answer the question by presenting the answer: "I think it is because of the bridges, there is no way for the ship to pass under".

The student, observing the Vitória/ES bay, realizes that the height of two bridges, the Ponte Florentino Avidos and the Second Bridge, built to connect the island of Vitória / ES to the mainland, prevents ships from anchoring in Cariacica side of the bay. This perception of students made it possible for them to see that the science and technology impacts can be beneficial, but they can also be negative. In this case, the city of Cariacica lost the possibility of having ports built, which impacted negatively its economic development.

Regarding the Social Practice category, Leonor (2013) states that it occurs when students are able to associate the scientific knowledge that has been learned by using it in their daily reality, having the ability to reflect and intervene critically in their social environment.

The scientific literacy "social practice" indicator was manifested in the episode in which students should relate the risks that Mochuara Park may suffer, from human action. Let´s observe the students' responses:

> Student 1: Trash.
>
> Student 2: Deforestation.
>
> Student 3: Fire in clutter camps.
>
> Student 4: If there is no protection, man will end with everything.

Student 3, on the other hand, managed to establish an association with the video he watched on social networks, when looking for information about Parque Mochuara, with the one he observed during the field class, recording the following report:

> I was talking to my mom about the promenade, and she told me it could be dangerous there. She did. Then I went to search in the internet about the place, and I saw some cool images that a guy posted: Mochuara now. And Mochuara afterwards, full of houses. At that time I did not understand well, but in the field class. I realized then that people can occupy it all. Urbanization is getting very close (Student 3, 2018).

Quoting Freire (2016) point of view about social practice, we found that, in the struggle of the oppressed for liberation, there are no active or passive subjects, all are equally subjects of action and reflection, becoming subjects of praxis. Based on this perspective, a pedagogical activity that seeks to carry out a work based on emancipatory scientific literacy must be constituted not only in the teaching of scientific concepts, but in an education that enables a counter-hegemonic cultural revolution in the relationship between man and world. In this sense, Freire (2016) argues; "It is not in silence that men make themselves, but in words, at work, in action-reflection (Freire, 2016, p. 108).

V. FINAL CONSIDERATIONS

Regarding to the contributions of the field class for the development of scientific literacy, we understand that it has succeeded in reaching its goals. The analysis categories dialogued with the evidences that manifested themselves during the pre-field, field and post-field stages, which were recorded in the logbook, in the video transcriptions, in photographs and in the illustrated portfolio.

As presented in the analysis and discussion of this research, the data collected were consistent with the listed categories, as we found that the students in the class who

https://dx.doi.org/10.22161/ijaers.74.58 *ISSN: 2349-6495(P) | 2456-1908(O)*

participated in the research made the field class a space for fighting to overcome the alienation process in relation to human activities on the environment on which they depend. The students were able to question, for example, what would happen to the city's water supply if Parque Mochuara collapsed, due to degradation actions caused by engineering works. Advancing the reflection, with regard to social representations about the class, they transformed the negative label they received at school, in an increase of self-esteem. They are not meaningless actions, but they come to life when they are related to the different moments of field activities.

We understand with the results of this research that it is possible to build a concept of emancipatory scientific literacy that, in the perspective of Paulo Freire's Theory of Liberation, can enable students to more than just a word reading, but a critical reading of the world!

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