CINEMATOGRAPHIC ART AND SCIENCE TEACHING FOR ELEMENTARY II STUDENTS: EXPERIENCE REPORT

A ARTE CINEMATOGRÁFICA E O ENSINO DE CIÊNCIAS PARA ESTUDANTES DO FUNDAMENTAL II: RELATO DE EXPERIÊNCIA

ARTE CINEMATOGRÁFICO Y ENSEÑANZA DE LAS CIENCIAS PARA ESTUDIANTES DEL ENSEÑO FUNDAMENTAL II: RELATO DE EXPERIENCIA

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ABSTRACT: This is an Experience Report at the elementary school level, using cinema to raise learning questions and promote active learning. The experience took place during a didactic sequence on arboviruses. To illustrate the subject, the Class Regent used a documentary about the Zika Epidemic in Brazil. After the documentary was shown, the children began to ask questions about various issues related to Zika, the vector insect, but also about the art of cinema. With great sensitivity, the Regent turned her lack of knowledge into a pedagogical innovation: she suggested that the students write a handwritten letter addressed to the Director of the documentary. The letters and the responses created a rich collective experience of construction and reconstruction of school knowledge. In conclusion, we emphasize the importance of using cinema as a didactic resource in elementary education, with appropriate teacher mediation.

KEYWORDS: Cinema. Pedagogical innovation. Aedes aegypti. Arboviroses. Zika.

RESUMO: *Trata-se de um Relato de Experiência ao nível do ensino fundamental II, utilizando-se o cinema para suscitar questões de aprendizagem e promover uma aprendizagem ativa. A Experiência ocorreu durante uma sequência didática sobre arboviroses. Para ilustrar o assunto, a Regente de Classe utilizou um documentário sobre a Epidemia de Zika no Brasil. Após a exibição do documentário, as crianças começaram a fazer perguntas sobre várias questões relacionadas à Zika, o inseto vetor, mas, também, sobre a arte cinematográfica. Com muita sensibilidade, a Regente transformou o seu não-saber em uma inovação pedagógica: sugeriu aos estudantes que escrevessem uma carta à mão endereçada ao Diretor do documentário. As cartas e as respostas criaram uma enriquecedora experiência coletiva de construção e reconstrução do conhecimento escolar. Como conclusão, ressaltamos a importância de se utilizar o cinema como recurso didático no ensino fundamental, com a apropriada mediação docente.*

PALAVRAS-CHAVE: *Cinema. Inovação pedagógica. Aedes aegypti. Arboviroses. Zika.*

RESUMEN: *Se trata de un Relato de Experiencia a nivel de enseñanza primaria, utilizando el cine para suscitar cuestiones de aprendizaje y promover un aprendizaje activo. La Experiencia ocurrió durante una secuencia didáctica sobre arbovirosis. Para ilustrar el tema, la Regente de Clase utilizó un documental sobre la Epidemia de Zika en Brasil. Tras la proyección del documental, los niños comenzaron a hacer preguntas sobre varias cuestiones relacionadas con el Zika, el insecto vector, pero, también, sobre el arte cinematográfico. Con mucha sensibilidad, la Regente transformó su no-saber en una innovación pedagógica: sugirió a los estudiantes que escribieran una carta a mano dirigida al Director del documental. Las cartas y las respuestas crearon una enriquecedora experiencia colectiva de construcción y reconstrucción del conocimiento escolar. Como conclusión, resaltamos la importancia de utilizar el cine como recurso didáctico en la enseñanza primaria, con la adecuada mediación docente.*

PALABRAS CLAVE: *Cine. Innovación pedagógica. Aedes aegypti. Arbovirus. Zika.*

Introduction

This Experience Report seeks to show the potential of cinema in the construction and reconstruction of school knowledge, particularly in addressing complex topics, such as arboviruses. In addition to this main objective, we seek to promote scientific curiosity, reflection and children's protagonism, through an innovative pedagogical experience – writing letters on a scientific topic – the Zika epidemic in Brazil.

These two objectives were worked on with children from Elementary School II at a Public School in Nova Friburgo, RJ, in 2019, through a teaching sequence (Zabala, 1998; Arantes, 2019) about arboviruses. According to Zabala (1998), a didactic sequence is a way of linking and articulating the various didactic activities throughout the teaching-learning process of a concept or topic.

For Arantes (2019), a good didactic sequence, at the level of basic education, should contain: thematic axis, awareness, meaningful activities, playful activities, fixing content and evaluation. Even though the thematic axis – arboviruses – was already given by the Curricular Guidelines, we used cinema to raise awareness and to provide students with the playful dimension, highlighted by Arantes (2019).

In the educational sphere, cinema can also be used to raise new learning questions. Learning questions are understood as questions proposed with the aim of encouraging the student to think, reflect and seek solutions to a given problem. Although they are generally formulated by the teacher, it is possible to encourage the student body in their elaboration.

Considering the potential of cinema, both in the productive field, with unique arrangements between technique, aesthetics and poetics, but also in the emotional field of those who enjoy it, it is possible to enrich certain scientific contents, considered dense and decontextualized, to make make them more palatable and closer to the students' reality. Addressing learning content, from the perspective we are reporting here, implies that students can learn to decode and give new meaning to the content conveyed by cinema. We believe that this process can generate a radical transformation in the concept of teaching, which moves from the mistaken idea of instruction, of memorization, to that of construction.

Methodology

In 2019, during a teaching sequence (Arantes, 2019) about arboviruses, the Regent of a regular 5th year elementary school class in Nova Friburgo, RJ, used a documentary about Zika, as a pedagogical resource. Even though the aforementioned documentary uses technical language, with difficult concepts for the educational level of the 5th year of schooling, the children were enchanted by the scenes of the metamorphosis of the *Aedes aegypti mosquito,* with the strategies for controlling the population of this species and were very sad to see see children with microcephaly, caused by the Zika virus.

By instigating children's curiosity, what would be just a documentary, used as a pedagogical resource to illustrate a certain didactic sequence, became a source of curiosity for students, raising countless questions of a biological, social and ethical nature. Some of the questions were answered immediately by the Class Regent, others, however, she did not know how to answer technically, but, wisely, she suggested another constructivist activity based on a cognitive challenge, namely: Why don't you write a letter to the film director? The children looked at each other without really understanding what the Regent was proposing. The explanation came next: She told the students that she knew the Director of the film and that, if they wrote a letter explaining the questions, she would take care of taking them to the recipient. This was the beginning of a great adventure in knowledge, succinctly described in this Experience Report.

Although the idea of writing the letters had not been previously planned by the class Regent, the interest of the students and the questions they asked, after viewing the documentary, created the opportunity for qualitative and co-participatory research, involving teachers and students from the 5th grade of schooling, developed according to the Cartographic Method (Deleuze; Guatarri, 2011). This method favors a qualitative, participatory and interventional approach, and has been widely used in the human sciences (Barros; Kastrup, 2012; Passos *et al*., 2014) and, therefore, can be used in education.

Inspired by the philosophical concept of rhizome, this Method is characterized by flexibility and adaptability to different contexts, breaking with the hierarchical and linear structures of Cartesian thought (Descartes, 1996). Thus, Cartography rejects the establishment of predetermined procedures to achieve rigid goals, opting for guidelines that are considered clues for investigation. The focus is on the process itself, which transforms according to the discoveries and new questions that arise during the intervention in the research field (Passos *et al*., 2014). In this way, the stages are defined along the research path, in a temporal drift. It is

worth highlighting that drift does not mean moving to any place, but, following the historical flow of encounters, to a place, even if it cannot be defined a priori. As the participants and encounters are multiple and recurrent throughout the research, we can replace the concept of temporal drift with interpersonal historical co-drift, which is understood as the result of the network of conversations (Maturana, 2002) that emerged in the educational space. The researcher's careful observation and field records are fundamental to the research, without losing sight of the events and the effects of each action on everyone involved in the experience (Barros; Kastrup, 2012).

With the aim of using the letters written by Elementary School II students in educational material for the School itself, but also articles and books for scientific dissemination, those responsible for the children were asked to sign a Term of Assent, agreeing to the use of the letters from their respective children for educational, non-profit purposes.

Results

Didactic Sequence Performed by the Elementary II Regent

The didactic sequence on arboviruses comprised several activities, namely: lecture, homework on arboviruses, drawings, newspaper and magazine clippings; film/documentary about Zika, letter writing; script workshop, staging of a theatrical sketch and evaluation of the activity by the students themselves. Below is a summary of the steps carried out by the Regent vis-à-vis what is recommended as a good teaching sequence (Arantes, 2019).

Table 1 – Comparison between what is recommended and what was accomplished

RECOMMENDED	ACCOMPLISHED
Thematic axis Choose a theme for the sequence;	**Arboviruses**
Awareness A first activity to introduce the child to the theme or concept;	**Watch a documentary** Name of the documentary shown in the classroom: Who said: about this Zika thing.
Meaningful activities Activities related to the theme based on skills that are intended to be built and that are part of the students' reality;	**Cards** Work on the textual genre Letter and write one to the documentary director, explaining questions and learning issues
Playful activities Activities that the student, as the protagonist of the teaching-learning process, can carry out, with playfulness, in their domain of coexistence with other students.	**Script for a Theatrical Skit addressing a problem related to the topic** Collective production of a script for a theatrical skit problematizing the responsibility of humans and monkeys in the transmission of arboviruses.
Content pinning Activities that retrieve the content seen to help consolidate what the student has learned;	**Theatrical play with puppets** Staging, photographic and film recording of the solutions proposed in two different scripts. To this end, puppet theater was used as a communicative and content consolidation strategy.

Assessment As a final objective, the student must do an activity that evaluates all their knowledge in relation to the thematic axis addressed.	**Assessment** The students' evaluation of the Script Workshop, staging of the Theatrical Skit and photographic and film recordings, based on three guidelines, namely: (a) define in one word what you felt; (b) write about what you liked most and (c) what can be improved.

Source: Prepared by the authors

Preparation of Letters by students

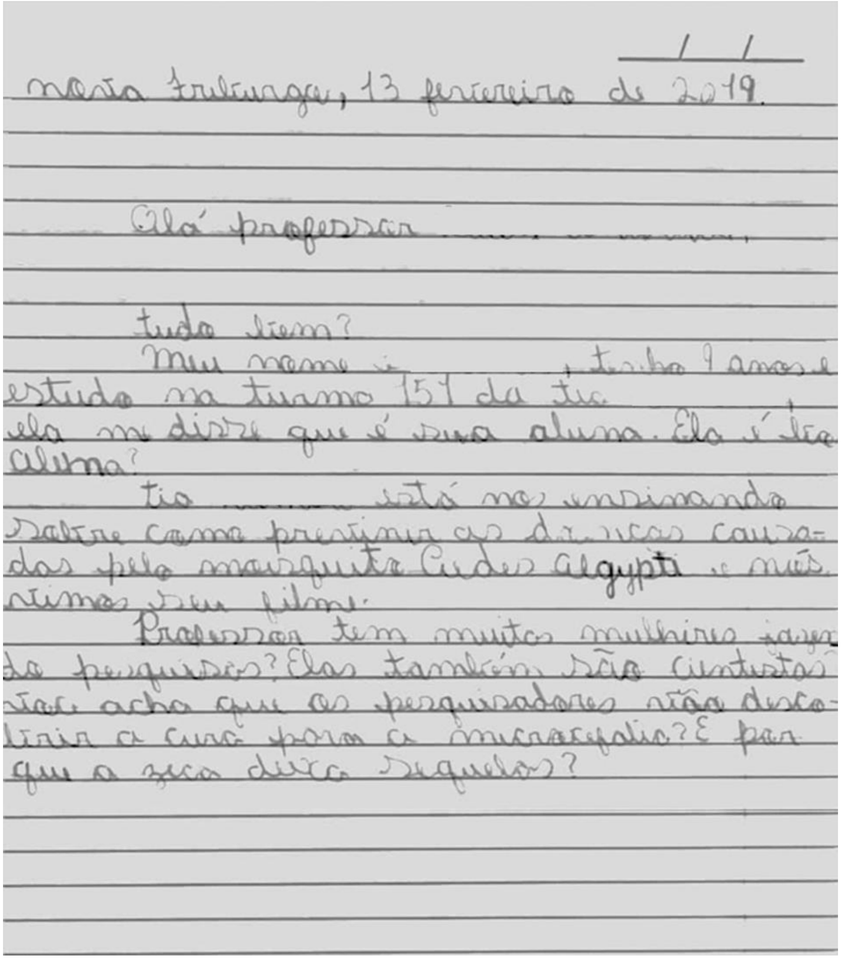
Once the challenge was launched to the students, the question arose about how to proceed with the preparation of the letters. After a brief reflection, the Regent decided that the writing would be done as a "homecoming". It would be a way to give students a break so they could reflect on the content learned in the classroom, and, therefore, encourage them to formulate questions.

The decision was right. The next day, the letters were collected by the Regent teacher who immediately noticed the richness of the material, especially the originality of the questions. He also realized that letters, written in different formats, should be worked on in their formal and textual aspect, before being sent to the recipient. Noting that the vast majority of students, if not all, had never written a letter, the pedagogical need arose to work on the basic elements that make up a letter: (a) header, containing the place from which it was written, the date and the salutation; (b) presentation of the sender; (c) development of the subject and, finally, (d) conclusion and farewell. Once this step was completed, the letter was rewritten, using a black pencil. The rewriting of the letters was carried out in the classroom. The Regent's mediation was restricted to restructuring the form without, however, intervening in the style or in the questions created by the students. A few students were absent that day, but were able to rewrite the letter another time.

Since it was impossible to transcribe all 24 letters and their respective answers in this Experience Report, we selected three to exemplify the richness of the material, the originality of the questions, the maturity of the children and the adventure of knowledge provided by the experience of exchanging information surrounding the film/documentary.

THE LETTERS

Figure 1 – Letter 1, Nova Friburgo 02/13/2019



__/__/__

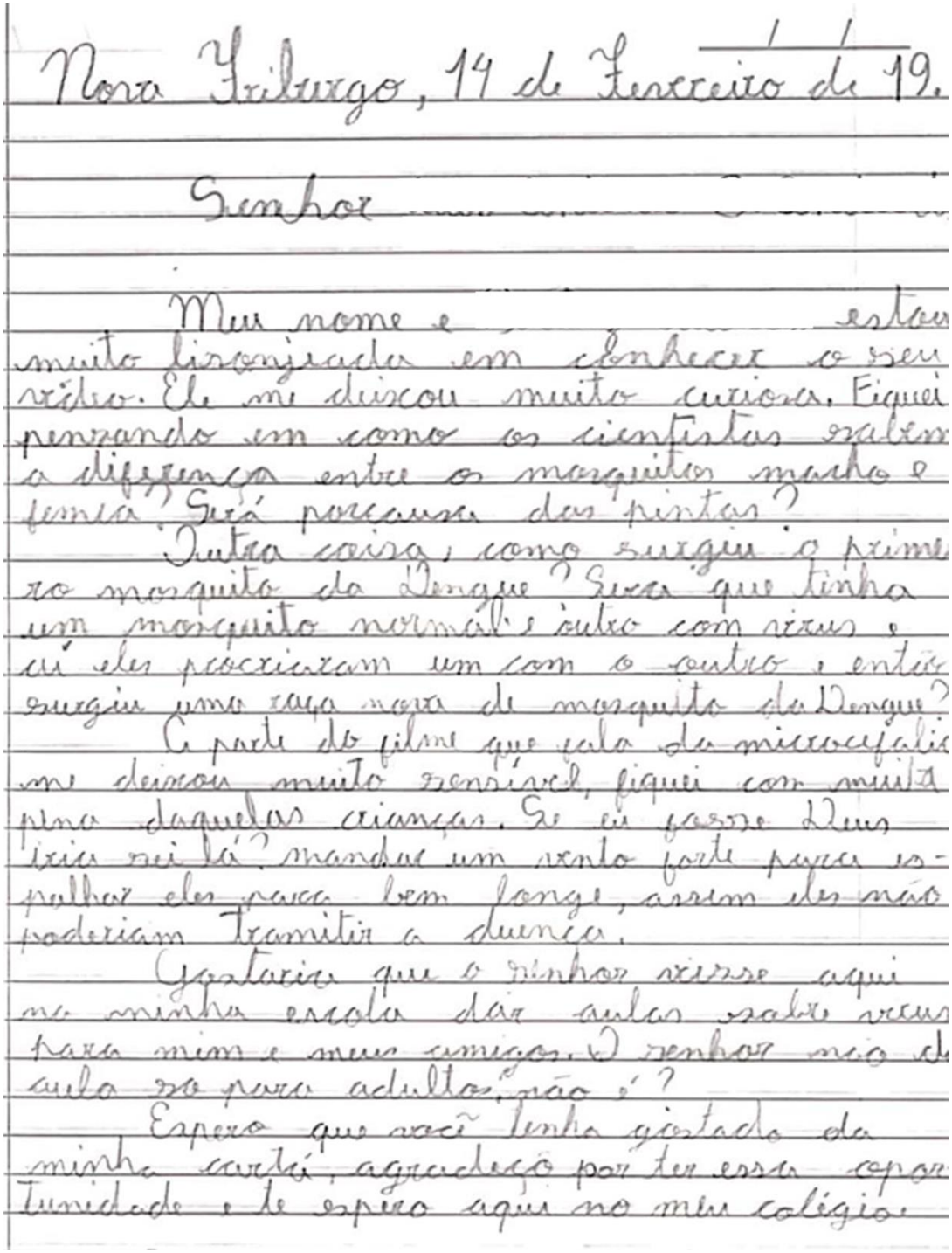
nova Friburgo, 13 fevereiro de 2019.

Olá professora ______,

tudo bem?
Meu nome é ______, tenho 9 anos e
estudo na turma 151 da tia ______.
ela me disse que é sua aluna. Ela é tua
aluna?
tia ______ está nos ensinando
sobre como previnir as doenças causa-
das pelo mosquito Aedes aegypti e nós
vimos seu filme.
Professora tem muitas mulheres fazen-
do pesquisas? Elas também são cientistas?
Você acha que os pesquisadores vão desco-
brir a cura para a microcefalia? E por
que a zica deixa sequelas?

Source: Authors' collection

Figure 2 - Letter 2- Nova Friburgo 02/14/2019



Nova Friburgo, 14 de Fevereiro de 19.

Senhor .....

Meu nome é ..... estou muito lisonjeada em conhecer o seu vídeo. Ele me deixou muito curiosa. Fiquei pensando em como os cientistas sabem a diferença entre os mosquitos macho e fêmea. Será pelas cores das pintas?

Outra coisa, como surgiu o primeiro mosquito da Dengue? Sera que tinha um mosquito normal e outro com vírus e aí eles cruzaram um com o outro e então surgiu uma raça nova de mosquito da Dengue?

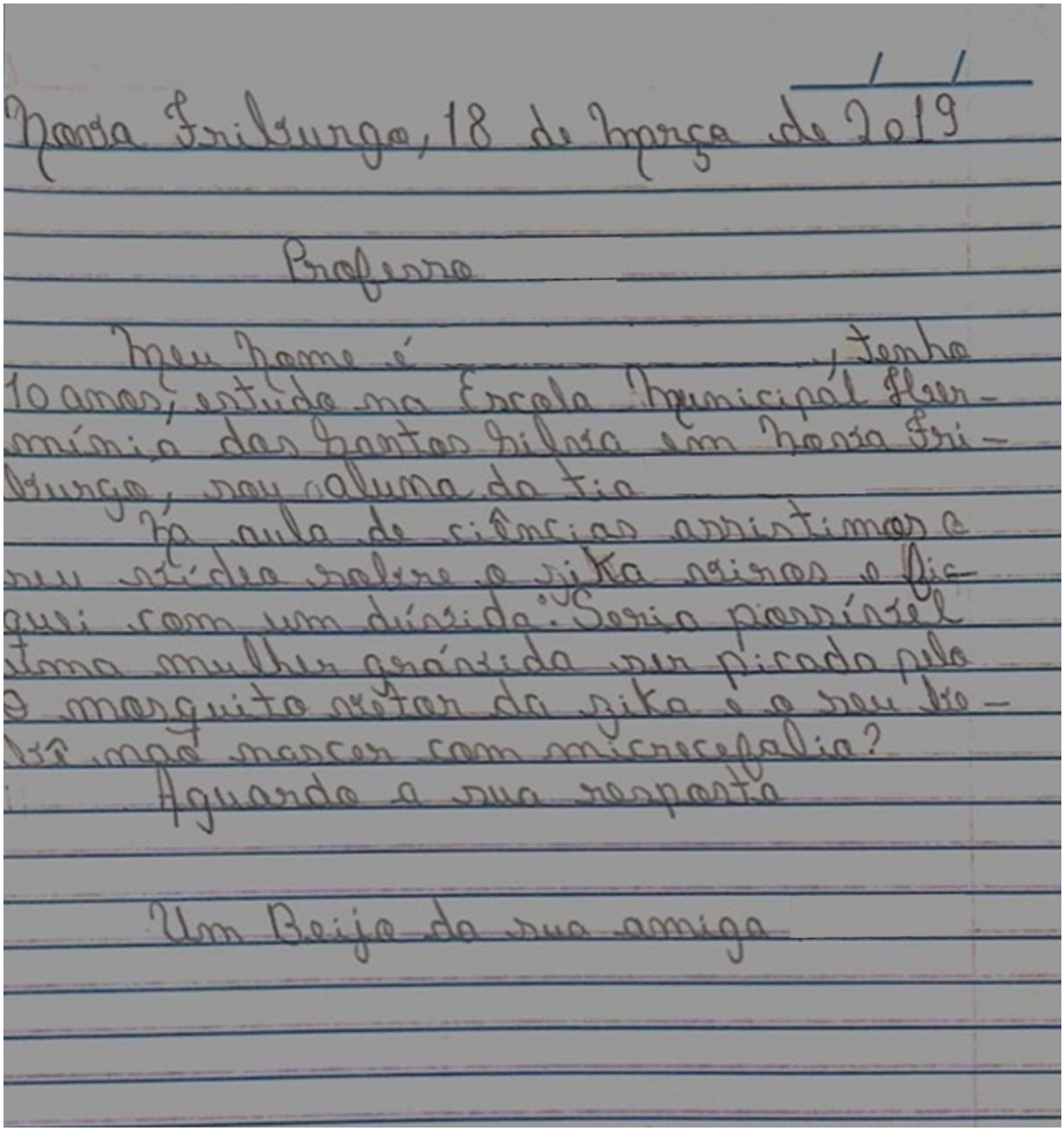
A parte do filme que fala da microcefalia me deixou muito sensível, fiquei com muita pena daquelas crianças. Se eu fosse Deus lá no céu mandava um vento forte para espalhar eles para bem longe, assim eles não poderiam transmitir a doença.

Gostaria que o senhor viesse aqui na minha escola dar aulas sobre vírus para mim e meus amigos. O senhor não dá aula só para adultos, não é?

Espero que você tenha gostado da minha carta, agradeço por ter essa oportunidade e te espero aqui no meu colégio.

Source: Authors' collection

Figure 3 – Letter 3, Nova Friburgo 03/18/2019


Nova Friburgo, 18 de março de 2019

Professora

Meu nome é _____, tenho 10 anos, estudo na Escola Municipal Flerminia dos Santos Silva em Nova Friburgo, sou aluna da tia _____

Na aula de ciências assistimos o seu vídeo sobre o zika vírus e fiquei com um dúvida. Seria possível uma mulher grávida ser picada pelo o mosquito vetor da zika e o seu bebê não nascer com microcefalia?

Aguardo a sua resposta

Um Beijo da sua amiga

Source: Authors' collection

Preparation of response letters by the Documentary Director

Upon receiving the Letters from students at their work at the University, the film's Director read each one several times. The beauty of the writing, the arrangement of ideas, the originality of the questions and the ethical and social issues, easily highlighted in some of them, moved the Director and everyone who had the privilege of reading the set of Letters.

The response letters, written by the Director, were individualized and, thus, each student received a personalized response. Due to the degree of intellectual maturity of those children, the Director opted for a non-childish language, sometimes technical, permeated with scientific concepts, imagining that they could be read and re-read by the recipients, at different moments in their lives. All questions were accepted as legitimate and therefore answered honestly, even the most difficult ones, which addressed open questions within science.

Reception of Response Letters by Students

The delivery of the Response Letters to the students and their individual reading during the class was also marked by great emotion, given the expectations that had been created in the class. Everyone read their respective response letters carefully, as if that document was also the return of a gift. The students showed the response letters to each other, as if they were hidden friend or Christmas gifts. It should be noted that many of those children, if not almost all, had never written or received a letter. The speeches and expressions of joy were surprising – “I’m going to stick it on my wardrobe door”, “I’m going to stick it on the wall”, “the letter arrived on my birthday”.

In Table 2, there are the questions extracted from the three Letters chosen as an example of this Experience Report and the respective responses from the film's Director.

Table 2 – Questions from students and the respective answers prepared by the Director

Questions	Director's summary responses
Letter 1 Professor, are there many women doing research? Are they also scientists? Do you think researchers will discover a cure for microcephaly? Why does Zika leave consequences?	Yes. As shown in the film, they stood out as much or even more than men in combating the Zika Epidemic in Brazil. It was not by chance, but due to their participation, scientific capacity and dedication to that cause – the Zika epidemic – that doctors Celina Turchi and Adriana Mello were decorated for their respective scientific work in Brazil. " Nature ", one of the most important scientific magazines in the world, named Dr. Celina Turchi as one of the most outstanding scientists in the world of science in 2016. Watch the film again and write down your participation in your notebook of women, in each scientific discovery for the understanding and control of the Zika Epidemic in Brazil. Scientists already know how it can be caused. The problem is that, once this occurs, it is impossible to revert the head to normal size, in relation to age. One good thing, however, is that functions can be improved with early stimulation. The Zika virus has tropism (attraction) for dividing nerve cells. As neurons in the baby's brain divide quickly, the sequelae comes from the exacerbated death of neurons that divide quickly in the baby's brain, caused by the Zika virus.
Letter 2 I was wondering how scientists know the difference between male and female mosquitoes? Just because of the moles? Another thing, how did the first Dengue mosquito appear? Could it be that there was a normal mosquito and another with the virus and then they bred with each other and then a new breed of Dengue mosquito emerged?	The male is smaller than the female, but has a pair of antennae with much more bristles ("fluff") than the female. In the film (film name and link) you can see this difference in the images of the male mosquito (14 minutes and 23 seconds) and the female (14 minutes and 32 seconds). Therefore, it is not because of the spots, which are distributed equally on the bodies of male and female mosquitoes. Imagine that, at some point in the long evolutionary process, a female *Aedes aegypti* mosquito, which feeds on blood, was infected by the Dengue virus when she sucked the blood of an animal contaminated by this virus. If this virus multiplies in this female 's body, she will now be infected. When she looks for another animal (now normal, that is, without the virus) to feed on blood, she transmits, through her saliva, this same virus and, thus, this normal animal from which she previously sucked blood remains, now, contaminated. A cycle of successive contaminations is completed which, in nature, without the presence of man, is called the sylvatic cycle. Thus, there is no breed of Dengue mosquito, but rather the continuation of successive contaminations of mosquitoes with the Dengue virus, within the scope of the sylvatic cycle.

Letter 3 Would it be possible for a pregnant woman to be bitten by the Zika mosquito and her baby not be born with microcephaly?	Your question refers to the possibility of a pregnant mother being infected by the Zika virus and the baby being born normal. There is a very famous Brazilian researcher – Mayana Zatz – who works at the University of São Paulo (USP) who asked this same question. In her study, she compared nine pairs of twins. Two pairs were identical (monozygotic), that is, they were genetically identical, and both had sequelae caused by the virus; one pair was not identical (bi-vitelline or dizygotic), and both were affected. Interestingly, of the other six bi-calf pairs in the study, one of the children was affected and the other was not. This demonstrated that, to answer your question, it is possible to have a normal child born to a mother infected with the Zika virus. The study by researcher Mayana Zats demonstrated that there is a genetic factor that increases or decreases the susceptibility to the entry of the Zika virus into nerve cells, which proliferate greatly in the brain of human embryos during pregnancy.

Source: Prepared by the authors

In addition to biological questions, elementary school students asked questions of a technical nature, in relation to cinematographic art, and ethics, in relation to children with microcephaly. The curiosity about making films was made clear by the invitation of some students for the Director's Team to visit the School, to teach them how to make a film.

As exemplified in Table 2, the questions were answered through individual letters addressed to the students, but it was still necessary to respond to the request, made by some students, for a visit to the School, to talk about cinematographic technique, the production of documentaries and filmmaking of educational films.

The Director and his Team visited the School on a suitable date – November 27, 2019 – a few days before the end of the school year, as the class, upon completing its last year at school, would separate.

Visit of the Director and his Team to the School

The meeting between the Director's Team and the class, including the Regent, was exciting – curiosity and admiration on both sides. After a brief speech about film production, the Director congratulated the class and, in an ongoing manner, so as not to waste too much time, a script creation workshop began, based on a problem situation. To continue exploring the theme of arboviruses, a challenging, fictitious problem was proposed, but created from the reality of the social moment – the great death of monkeys in the forest due to a viral disease,

but also due to human action. We took the opportunity to reinforce what they had already learned about arboviruses with the Regent Professor, especially regarding the error in attributing "responsibility" for the transmission of diseases to humans to sick monkeys. The monkeys would thus be victims of a double deadly action - human and infected mosquito.

After the challenge was made and accepted by the students, two groups were formed to work cooperatively on solving the problem and, later, on staging and photographing and filming the solutions proposed in two different scripts. To this end, puppet theater was used as a communicative strategy. Within each group, the students were divided and each voluntarily assumed different roles and specific tasks – coordinator, editor, screenwriter, actor, photographer, cameraman, direct sound, producer, etc. To ensure everyone's participation, especially during filming, we rotated some of these functions, as everyone wanted to photograph and film, using the equipment brought by the Team, for this special moment.

Regarding puppetry, the characters they chose were human beings and forest animals. Although different, the two groups' solutions to the proposed problem had some structural similarities, namely: both decided to consult experts and, to provide greater social visibility, both decided to hold a public demonstration and produce a film. However, the texts and scripts produced by each group, as well as the characters used in puppetry, were different. To solve the problem of time and equipment availability, we proposed a division of tasks, that is, while one group performed the play with puppets, the other recorded images and audio, using cameras and microphones, as if it were a real team of production. The estimated time used to carry out the proposed activity was 150 minutes. This required time control, which was well understood by the students, who returned from recess to finish the activity, paying full attention.

Assessment of activities by students

The students' assessment of their experience in the Screenwriting and Cinematographic Workshops was guided by three guidelines, namely: (a) define in one word what you felt; (b) what you liked most and (c) what can be improved. The following words show the class's feelings towards the activities they experienced: joy, radiant, incredible, interesting, responsibility, happiness and emotion. Joy and happiness were the most highlighted words.

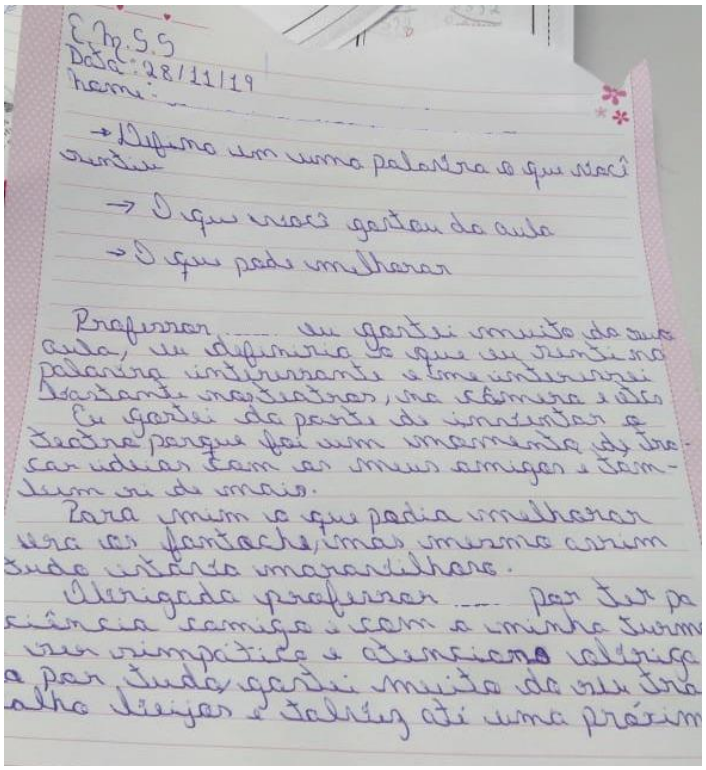
Regarding the second question, the students enjoyed creating the story, using the equipment, acting with the dolls or carrying out a combination of these activities. There were also those who highlighted the fact that the students were all together, collaborating with each other in creating the script, rehearsing the theater and filming. The vast majority of students

affectionately identified the external Team members as friendly. The reciprocity of affection, respect, joy and responsibility, individual and collective, made this event a success.

As for the question of what could be improved, the answer was almost unanimous - “nothing”. The exceptions were the concern about the lack of participation of some students “due to shame”, the delay in writing the script and the adaptation of some dolls to the child's size.

As it is impossible to show here all of the students' evaluations about the Experience they experienced during the Cinema and Theater Workshops, we selected one, as an example, from the author of the 3rd letter, shown here.

Figure 4 – Student evaluation of the recreational activities of the Cinema and Theater Workshops



Source: Authors’ collection

With the student evaluations, we produced the following Word Cloud.

Figure 5 – Word Cloud constructed from student evaluation

Source: Authors' collection

Discussion

The biological questions formulated by children in the 5th year of school provoke great reflection on the relationship between cinema, science and teaching. We say this because there is no direct informative, instructive or communicational relationship between what was shown in the film/documentary, with a technical language, very dense for that year of schooling, with the sophistication of the questions asked by the children. How then can we explain what happened? Having ruled out the interference of the Regent, the main author of this Experience Report, there would still be the possibility of "help" from the parents. After reading the set of Letters several times, we also discarded this possibility since the style of the grammatical, semantic and argumentative constructions, evoking, for example, "a strong wind from God to carry the mosquitoes away", and the emergence of a "new breed of Dengue mosquito", derived from the crossing between a normal mosquito and an infected one, is compatible with the cultural context of middle-class children in the municipality of Nova Friburgo, RJ, and with the level of education provided by the School. Another observation reinforces the authorial character of the Letters, namely: the texts produced by the students, as an evaluation by the Cinema and Theater Workshops, showed the same maturity observed in the writing of the Letters. In a quick analysis, taking as an example the assessment produced by the author of

Letter 3, we can see several skills: maturity in writing; logical chaining, based on the guidelines provided by Regent; valuing autonomy and freedom to collectively invent the script and also be able to have fun in the process; criticism regarding the dolls/puppets and, finally, gratitude and recognition for the teaching work.

It is important, in this context, to include the relationship between cinema and science teaching in our discussion. After much reading, we found a reasonable explanation, formulated by Professor Edson Pereira da Silva, at the 1st UFF CineCiências Exhibition, in 2018. Thus, says the aforementioned professor.

> Cinema is poetry! Which means that unlike science, which is pure prose, the relationship with the reference is not one of submission, but of subversion. Science is characterized, fundamentally, by the separation between the one who wants to know (subject) and the thing to be known (object). In this sense, language in science is dedicated to analyzing, describing, illustrating, narrating, commenting on an object, that object that we intend to know. Language in science, therefore, is governed by the rules of clarity, accuracy, intelligibility. It is a language for understanding an object that is outside it. The language of science is prose! Cinema, on the other hand, is a significant chain that is constituted in the world through the assembly of units constructed in a flash: Action! Cut! In other words, in putting together plans. This definition assumes that cinema is the object. In this sense, far from the objectives of prose, it is more identified with poetry that raises, synthesizes, creates, and recreates the object in language. Cinema, like poetry, is an operation of naming and, thus, a creative act. That said, it is understood that the relationship between cinema and science, as outlined here, cannot be that of the use of one for the other (or vice versa). On the contrary, the relationship that is being defined here is one of estrangement (even if denied) and tension. In a word, the relationship between cinema and science is (and should be) dialectical. It is in this dialogue of differences that, outside of both, in the difference, a surplus is produced, a remainder of interest, the critical view. The dialectical relationship between cinema and science has teaching as one of its provisional syntheses (itself pregnant with estrangements and tensions). In other words, the use of critical views to discuss cinema as poetry that re-creates the object and science as a way of appropriating objects. It is believed that this way of understanding the relationships between cinema and science and their synthesis in teaching overcomes some of the blind spots in the uses that have been commonly established between cinema, science and teaching (Silva, 2018, our translation).

According to Silva (2018), we could interpret what happened as a synthesis derived from the dialectic between cinema and science. For him, this dialogue between different things – cinema, like poetry, and science, like prose, brings a novelty to the outside of both, teaching, if not as a completely systematizing and critical aim, but certainly instigating, as shown here in our Experience Report.

In addition to the discussion about the richness of cinematographic art in science teaching (Duarte, 2006), it is worth highlighting the educational significance of the concept of Experience, as presented to us by Dewey (1979a; 1979b). For the aforementioned author, not every action-reaction-action arc of the subject produces significant learning. For this to occur, an intellectual effort (reflection) is necessary to discover the relationships inherent to the process, as a whole, or to the particular associations inferred about it, which would characterize the reflective experience. In this same line of thought, Dewey also provides us with what, in his experience as an educator, become impediments to reflective experiences: mechanical routine and coercive procedures on the learner since, in both, there is a refusal, on the part of the learner, to in recognizing their responsibility for the consequences arising from the actions that are established in their own experience (Dewey, 1953). This responsibility is only assumed by the learner when the effort of reflection seeks meaning in their own experience. Thus, "experience is the result, the sign and the reward of this interaction of the organism and the environment which, when fully realized, is a transformation of the interaction, into participation and communication" (Dewey, 1953, p. 22, our translation).

If the record of experience allows it to be communicated through language (educational goal), as we are doing here, and also reconstructed by the subject himself, as an "experience of experience" (Dewey, 1979a), the that we intended with our main objective in this research – to promote active and meaningful learning. In a dense and poetic way, almost like an aphorism, the aforementioned author would say to the participants: "sympathetic identification with your own destiny" (Dewey, 1979b, p. 161, our translation).

Regarding science and science teaching, it is clear that both are human activities, in response to human concerns, and, therefore, the educator is inexorably involved in the field of research, not as a distant and neutral observer (Freire, 2002), but as an active participant, whose presence and actions influence and are influenced by the co-participants of the process, in this case - the students.

Taking together the three main points of our discussion – cinema, science and teaching; experience and involvement of the educator in the process, we bring to the fore the socio-constructivist dimension of learning which states that all knowledge is socially produced. From this perspective, the constructivist classroom uses a variety of activities – exposure, cognitive challenges, writing texts, educational games, films, paintings – to stimulate students in terms of meaningful learning and the construction of school knowledge. Constructivism, as a paradigm in the teaching and learning process, requires the educator to provide permanent

mediation with students and a variety of teaching resources to solve problems and cognitive challenges. For this paradigm, apprentices must have the opportunity to act on problems and, thus, develop creativity and critical analysis in the search for solutions. In this sense, learning is an active, continuous and lasting process, about concrete or created situations. It is expected, with this methodology, that students will increasingly become protagonists in the construction of knowledge, know how to deal with different problems, work as a team, communicate efficiently, think critically and solve problems inherent to living individually and in society.

Final remarks

Our objective of promoting active learning among students was fully achieved, as in addition to reinforcing school content, we experienced with them three other very important dimensions in the educational act – affection, playfulness and creativity. In fact, all students were positively touched by the proposed activities. This was observed by the Team, both in terms of everyone's participation in the process, and by reading the evaluation carried out by the students, exemplified in the Results.

We also verified the success of the proposed activities through the commitment and enthusiasm of the students in contributing ideas, reflections and solutions, as well as complying with previously established agreements for teamwork. The diversity of intellectual and communication skills, natural in any class, was evident. Therefore, it is important to recognize them to ensure the success of collaborative work and, consequently, for the individual and social development of everyone, at school and in society.

The pedagogical strategy of using films/documentaries associated with the preparation of letters by the student body depends, in our view, on three macro variables: teaching mediation, emotional involvement of the student body with the topic and time dedicated to the process. The latter cannot be long, so as not to disturb the programmatic content recommended by the school, but, on the other hand, it cannot be shortened, since the involvement of students is fundamental, however, this does not occur mechanically, after the announcement of the theme.

Our Team is collaborating with a large Project - IntegraChagas Brasil - which is now being carried out in the north of Minas Gerais, but which should be replicated in other parts of Brazil. Although the letter genre is being well accepted by students to address the topic of Chagas disease, other playful modalities have been suggested, such as theater and parody. As a

summary of our Experience Report, we would say that the adventure for knowledge requires dedication, involvement, creativity and openness to learn and transform in educational praxis as an educator-student and student-educator.

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