



CINEMA AS NARRATIVE TO TEACH NATURE OF SCIENCE IN SCIENCE EDUCATION

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Abstract

This work discusses the contribution of cinema as a tool for natural science education. Experiences come from an interaction with a learning environment and personal construction of knowledge occurs through the interaction between the individual's knowledge schemes and his or her experiences with the environment. In this way, movies are analysed by considering the potential of the narrative to teach understandings of nature of science, scientific and common languages to be used as a tool to mediating science teaching and learning. This occurs because of the integration of an individual's reality with the surrounding environment, which develops, in the student, the sensitivity and perception of the setting.

Keywords: cinema, nature of science, narrative.

INTRODUCTION

Science and technology are today the greatest factors in changing the way we live. They have also made the world very small, so that we no longer live in the confined world of our town, region, or country isolated from what is happening in the rest of the globe (Härnqvist and Burgen, 1997).

According to recent research in science education, teachers have conceptions, attitudes and actions related to science teaching supported by a lengthy environmental training period in which they were students (Hewson and Hewson, 1988). It means that there is a relevant influence of this incidental training that reiterates experiences acquired in a non-reflexive manner as something natural, thus escaping criticism. If some knowledge of science is accepted as part of the education of every student, there is a need to think how best to provide that education (Lemke, 1990).

It means, if these teachers don't have an adequate understanding of nature of science they can fail trying to teach NOS for students. Another important point is that when they teach NOS implicitly, students don't acquire understandings of NOS. Bell, Blair, Crawford and Lederman (2003) argue that NOS should be taught explicitly.

It is therefore important to think of education systemic term, not limiting the student's experiences to what can possibly take place in the classroom. On this way we can provide some situations to

confront student's views of science to challenge them to reflect about NOS. Experiences come from interaction with a learning environment.

As Holbrook (2010) point out:

Education cannot be developed in a vacuum. It needs a context and this context, inevitably in science lessons, involves science content and science conceptual learning. Thus, although science content need not be specified and may be related to a contemporary context, science lessons utilise the acquisition of scientific ideas to aspire to playing their major role in the development of students through an appropriate context.

It is fundamental that the teacher investigates what are the situations that could create interest and how it can be worked and articulated to the nature of science understandings, because it becomes a convincing act by showing to the students other ways to dialogue concerning reality. Personal construction of knowledge occurs through the interaction between the individual's knowledge schemes and his or her experiences with the environment. Science education must encourage the development of creative thinking (Laius and Rannikmäe, 2005).

We intend to discuss the contribution of cinema as a tool for natural science education to teach aspect of nature of science integrated in natural science classes. By presenting a movie, not only the content is transmitted, but experiences of all kinds: emotions, feelings, attitudes, actions, knowledge, etc., as the cultural acquisition can give to individual symbolic systems of reality's representation (Arroio, 2007). We highlighted movies create trends and have a broader impact on students than any other media. Besides movies are able to create interest in scientific themes (Serra and Arroio, 2008).

Cinema and Natural Science Education

The aim of this work is to purpose a reflection on cinema as a narrative in natural science education to understand how science works. The knowledge of how science works has been acknowledged by educational researchers, policy makers and teachers (Matthews, 1994). The word "narrative" has its roots in Latin, the *narro* means *relate* or *tell*. In general sense, narrative may be defined as "telling someone else that something happened" (Herrenstein-Smith 1981, p. 228 *apud* Metz *et al.* 2007). According to Norris *et al.* (2005) the narrative describes "the desire created in readers and listeners to know what will happen".

Movie is a narrative genre because it presents a story. Watching a movie is a collective public experience and a social occasion. Experiences come from interaction with a learning environment. Movie viewers' come with a large number of (mostly unconscious) expectations about how the filmic medium presents a real or fictional story. Above all, one generally assumes that the movie creates a verisimilar or at least likely world, a world that runs on laws of nature and logics. It is compatible with what might count as a fact or a possible experience in our own world; it is the movies' reality effect (Barthes, 1982).

The audiovisual language allows such integration of the individual-environment, because it deals with scientific concepts as well as showing characters living in a world that can be recognized and identified by the students (Serra and Arroio, 2009). Using the audiovisual language, it is possible to

join science, teaching and learning in a way that the communication becomes more efficient and learning more effective, besides raising interest and motivation of students in science. Another important aspect is that movies are an information source, like other media, directly influencing the perceptions and conceptions of the students related to science and how science works also their views of scientist. In this way they help in the acquisition of information process, contributing to the development of students' critical sense.

METHOD

We report on a movie analysis (Jahn, 2003) of *Lorenzo's Oil* (1992) considering the narrative aspects of it and the potential to use as a tool to teach some aspects of nature of science. On this way we adopt the purpose to movie analysis (Arroio, 2007). *Lorenzo's Oil* is a 1992 movie directed by George Miller, and played by Susan Sarandon and Nick Nolte. This narrative presents a story (based in real facts) of a child with a rare degenerative brain disorder diagnosed as ALD (adrenoleukodystrophy). As this disease is considered incurable, his parents start to study science to try to find the cure.

FINDINGS AND DISCUSSION

According to our analysis, *Lorenzo's Oil*, the narratives can be used to support the public with some elements that provide interactive experiences for them. The movie contributes in the development of many abilities such as the discussions during the activities: interpretation, analysis, criticize, that happen when the person identifies and explains a subject, recognize the author intentions, compare and establish relations, read and surveys hypothesis, find possible solutions for a problem situation. We should learn to understand *how* science works and science education *can* help us to help ourselves.

In the cinema are possible to deduce meanings and understand messages just watching, reading and interpreting images that help the story comprehension. Stories are used every day as a way of making sense of and communicating events in the world (Avraamidou and Osborne, 2008).

This approach on learning recognizes that an important way in which people is step by step being introduced to a scientific knowledge community by sharing a discourse in the context of relevant tasks.

Through movies it is possible to find science outside the school and realize how important science is to us. Science is thus realized as a complex of specific, situated human social and cultural activities. Science as a total system of social activities is not merely research science; it includes all the use of scientific practices at workplace, at home, in the environment. It is science as science is done and used by those who are trained to use it according to the norms of our society.

According to Rezende (2008) most movies used to present a factual perspective to discuss history of science for example, but as the same time this perspective can help us to teach about history of science they also can reiterate myths and stereotypes.

Lorenzo'Oil brings some situations that we can take advantage to discuss about scientific knowledge, on the other hand we can face students to confront their views about how science works, who can do science, just scientists? Or like on this movie the ordinary people like Auguste Odone? What kind of factors (society, economy, ethics, moral, idealism) can influence science? Are there an unique scientific method recognised by scientific community?

We present a dialogue from the movie that provide us with a situation to contextualize a discussion about how science is done for example, there are other situations on this movie to be discussed related to understandings of NOS:

(53min 45seg- 56min 27seg)

Dr. Gus: On the last six months, all the ALD patient are following the program that exclude the C24 and C26 saturated. Even with this restriction in their diet, these carboxylic acids still the same, nothing changes, in some cases it is increasing. I can say the biosynthesis is responsible.

Dr. #1: But Gus, if you could keep the diet and also inhibit the biosyntheses, you would have a therapy.

Dr. Gus: No, not exactly. You would have just on way to control the carboxylic acid.

Dr. #2: If you want to inhibit the biosynthesis, have you think about to manipulate the carboxylic acids? There is a research with rat about it, russian or polish I guess.

Miss. Odone: Polish. Straszak. I have a copy. Polish Journal of Biological Sciences, 1979 Volume II. They add one fatty acid decreasing the other's biosynthesis, in a competitive process.

Dr. #3: Yes, I remember this article. And also in Canada, they had noticed the same result in suine.

Dr. Rizzo: In fact, I've seen it in human cells. In human cells with ALD. I took skin cells from ALD patients, right? All them with the same genetic problems. I used oleic acid and reduced the C24 and C26 for more than 50 per cent.

Mr. Odone: Sorry doctor. Did you say oleic acid?

Dr. Rizzo: Monounsaturated C18, the main component of olive oil.

Miss. Odone: Undoubtedly, this is the base for a therapy.

Dr. Rizzo: Take care. This research was done for some cells. We don't know how it would work for human being.

Mr. Odone: So, use olive oil and try it...

Dr. Gus: Auguste, olive oil is not allowed in their diet: C24, C26.

Sr. Odone: Yes, but then use oleic acid as Dr. Rizzo did in his study.

Dr. Rizzo: Oleic acid would be toxic for them. It should be done using triglyceride form, that is for consume, but it doesn't exist.

Miss. Odone: Right, but why don't extract C24 and C26 from olive oil?

Dr. Rizzo: In theory we could do this, but it is a complex process and really expensive, even for clinic research.

Miss. Odone: Did you contact any chemistry industry?

Dr. Rizzo: None would do it. There are no market for this product.

Here we can discuss that science is done as a cooperative work by a group of scientists not for lonely scientist or just in one laboratory. Researchs from different parts of the world can collaborate

in developing scientific knowledge. The debate starts when the doctor mention one study manipulating carboxylic acid not related to ALD disease and go on until the possibility to apply that principles to the ALD problem.

It is also evident the economic aspects that influence on doing science. Science is done by scientists and there are different interests involved. Here we can see that if there are no economic potential on this product the indurtry don't have the interest to produce it. So what about the basic science research? All the research should be done just for applied science? Are science research neutral?

Another important aspect relateded to understandings of NOS is the image of science for students, the most present stereotype is the scientific method, some researchs have shown their views about he scientific method is a sequence of steps previosly organized and there is no space for imagination and creativity, the mais reason is if you follow the method you will find the true scientifically correct.

The identification process with the scenario, character, scene, dialogues is important to place the scientific content in a larger context and establish easy connections with the community outside school and to arrange the teaching situations. So the students recognise the whole content as being meaningful. Science alone will not make the world a better place. Learning the results and methods of scientific research will not in itself help students make better lives for themselves. We must all learn to understand *how* science and science education *can* help us help ourselves. Science education still has a great potential for good, but only if we take the true path of science ourselves, rejecting what has been and exploring together new ways of thinking, teaching, and learning (Lemke, 2005).

CONCLUSION

Movies can provide contexts which focus on scientific issues that should engage students. Where movies catch student's attention they provide different point of view, providing the teacher with an interesting possibility to discuss the understandings of nature of science. This environment provides a kind way of talking about the social context and the scientific knowledge related. The movie shows that learning science involves social interactions, discussing about how science works explicitly issues supported by audiovisual context seem to be an important possibility to mediate process of making-meaning on the science classroom.

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