



THE APPROACH TO NATURE OF SCIENCE IN A COMMUNITY OF PRACTICE MEDIATED BY FILMIC RESOURCES

Edson Rodrigues Santana, Agnaldo Arroio

University of São Paulo, São Paulo, Brazil

Abstract

This analysis highlights the relevance of the nature of science (NoS) approach in a community of practice (CoP) with the use of film resources. This approach was created to develop a training course for science teachers who teach in basic education. The course took place in 2012 at the Faculty of Education at the University of São Paulo. The results show significant participation and involvement of teachers with both the theme of the nature of science and the interest growing in it for teaching purposes. The data acquisition was performed with the recording and transcription of the involvement of five teachers.

Key words: *community of practice, nature of science, movies, teacher training.*

Introduction

Research, such as that of Akerson & Abd-El-Khalick (2005), has shown that elementary school students have difficulty to understand aspects of nature of science (NoS), which was also addressed by Driver, Leach, Millar & Scott (1996) and Mathews (1994) and has a certain association to another problem, namely the teachers and their conceptions of NoS, or the failure to include this issue in education (Bell, Lederman and Abd-El-Khalick 1998).

The authors emphasize the need for instruction of the subject in teacher training, not only restricted to the NoS approach, but to encourage the inclusion of this topic in teaching and learning situations.

Teachers' participation in communities of practice during training processes, along with the use of film resources, may favor the NoS approach, especially when supported by mechanisms of mediation to discuss not only the conceptual nature of the topic, but also incorporating concern practices in the classroom, as highlighted by Akerson *et. al.* (2012).

The justification for the defense of communities of practice included in the process of teacher training, specifically with in-service teachers. The belief that in some cases, training teachers is merely applying previously established ideas and practices. In communities of practice there is the consensus idea, or rather the meaning of power as alignment of contract or collective agreement as conferring authority / credibility to humans in power (Mosquera, 2008, p.33).

The concept of communities of practice (CoP) is recent, but the lived experience is old. For example, according to Wenger and Snyder (2001), in classical Greece corporations consisting of blacksmiths and potters can be characterized as communities of practice, as their members share common beliefs and cultural practices through which deities and belief in this sense established a social purpose among members.

At present, there are other forms of social interaction and forming different types of communities composed of members of the same profession, a fact which is explained

primarily by the changes that happened throughout history in the world of work. However the idea of clusters in CoP still persists and it can easily find it in the business world, governments, professional associations, non-governmental organizations and education, so it practices a form of ancient human relationships but with recent theoretical systematization.

In theoretical terms, the concept of CoP originates in the work of Lave (1988), and this researcher's knowledge is a product of a space and social practice in established contexts.

Also, according to Lave & Wenger (1991) the learning process is much more complex than the simple relationship between teacher and student. Lave & Wenger (1991) go on to say that learning is not just an abstract transfer of knowledge followed by information without context, instead, learning is to be considered participation in a social process in which knowledge is constructed with relevant context, social, psychological and cultural.

Two conceptual definitions expressed by Wenger (1998) summarize the presented above:

- I. "Communities of practice are formed by people who engage in a process of collective learning in a shared domain of human endeavour."
- II. "Communities of practice are groups of people who share a concern or a passion for something they do and learn how to do it better and how they interact regularly."

The contributions of Zeichner (2008) are relevant to our proposal because "being challenged and at the same time, supported by social interaction is important to help us clarify what we believe and to gain courage to pursue our beliefs" (Zeichner, 2008, p. 543).

In this sense, it is possible that interactions between teachers constructed in communities of practice may favor mechanisms of autonomy and a professional role, as they are established between individuals who recognize themselves professionally.

Also in Akerson *et. al.* (2012) one can find the relationship between communities of practice and teacher training in the NoS approach.

Contributions of Film Resources

It must be noted that the role of cinematic narrative or according to Turner (1997) the way viewers relate to images and sounds, is similar to aspects of dreams. "As films, dreams have the ability to express thought through images; and also tend to narrative structures, with the impression of being more than real" (Turner, 1997, p. 111).

Arroio (2010) quoting Barthes (1982) highlights another important contribution which is that a movie can create a believable world, a world that is impossible to experience in the real world. The film narrative, through the mechanisms of identification and projection, makes it possible, at least in the logic of this narrative, as they produce effects that simulate reality. For example, some films seek to hide the aspect of representation and create effects that are closer to reality, with the purpose to arouse the mechanisms of identification / projection and adhesion, as described by Morin (1970).

Arroio & Farias (2011) and Santana & Arroio (2012) argue that just having access to the movies is not enough, therefore, one that guides the work with this training material in order to articulate the aspects of visual understanding is necessary to epistemological NoS.

It was incorporated the use of cinema as a term developed by Wertsch (1999) to designate the importance of symbolic mediation between people in a communication process that involves the inserted cultural relations in a group cultural tool.

Purpose of the Study

The aim of this study is to investigate the relevance of a CoP subsidized by filmic resources to address the NoS. How teachers are supported in the CoP? How are shared experiences and practices among teachers?

Methodology of Research

The data were taken from recordings of a course for teachers that happened during the second half of 2012 in the Faculty of Education at the University of São Paulo. For analysis of collected data it was categorized as interactions between teachers with ideas and practices (IBTIPS).

The justification for this category is based on the contributions of Bogdan and Biklen (1994), for “certain issues and concerns of the research give rise to certain categories” (Bogdan & Biklen, 1994, p. 221).

Also according to these authors, it is possible that for each class encoded, there are other families included, thus being used a combination of coding perspectives taken by the subject, including what was described by Bogdan & Biklen (1994, p. 223) to develop our category.

The methodological guidance and data analysis of this study sought to follow the assumptions of qualitative research in education. In this way, qualitative research is more concerned to describe the processes that quantify results, or as Cohen, Manion and Morrison (2007) state “The social and educational universe is therefore not a susceptible cluttered place of contradictions and dysfunctions in the processes of atomization inherent to numerical research “(Cohen, Manion & Morrison, 2007, p. 167). Therefore, it was sought to investigate the contribution of a CoP for the NoS approach using commercially airing movies. The audience was five basic education teachers in São Paulo, Brazil.

Data Analysis

This includes family oriented codes for ways shared by all or some subjects, but they are not as general as the perspectives they have on the general definition of the situation, although they reveal beliefs concerning specific aspects of the situation.

Therefore, the category of Interaction **coding among teachers** was derived from the family of coding **perspective taken by the individuals**, because there is a higher correlation between these flow lines of the interactive type or where more interaction between members is true. This category was necessary to introduce subcategories that were a necessity to capture the specificity of the sought data, so the following subcategories were created:

Subcategories of the category Interaction among teachers:

- Interaction between teachers with ideas and practices and NoS (IBTIP - NoS) sharing
- Interaction with teachers sharing ideas and practices and Movies (ITSIPM - Movies)
- Interaction with teachers sharing ideas and practices, movies and NoS (ITSIPM - Movies NoS)

What occurs within these three subcategories is the marked presence of interactions among teachers, which are observed in three statements: nature of science, concurrently in films and movies, or teachers' mediated interaction. The themes described are the basis of what are shared ideas and practices related to the themes of the subcategories.

The portions used for the construction of this category and its subcategories, required theoretical orientation, in this regard to rely on what Bogdan & Biklen (1994) describe regarding the influences during the development of coding in the analysis. According to this approach to data analysis, it is not exclusive and specific to the data, but also the prospects of the researcher, especially their beliefs and choices involved in the theoretical analysis. Therefore **Communities of practice and Elements of Teacher Education** are theoretical choices which were chosen to be analysed. Table 1 summarizes what was described above.

For better identification, the transcribed speech of teachers was grouped into steps, and each cluster was numbered according to a temporal order. To preserve the identity of teachers, they were assigned code names, for example, T1, T2...

Table 1. Organization of data extracted from the interactions between teachers in CoP.

Family codification	Category of codification	Subcategories
Perspectives obtained by the individuals	Interaction between teachers who shared ideas and practices	IBTIP – NoS ITSIPM – Movies ITSIPM - Movies - NoS

Results and Discussion

Category coding: Interaction between teachers, Subcategory: Interaction between teachers with idea and practice and NoS sharing (IBTIP - NoS)

Steps 3 and 5 (Table 1) were extracted after the initial conversation with the research group of teachers in which was discussed an article by our own that had some issues regarding the use of experimental activity in the classroom.

One of our goals was that teachers realize the importance of theories in the construction of the scientific knowledge process, and to discuss and take forward some of the aspects that arise in scientific research as observation and inference, especially as these

concepts are carried to the room to conduct classroom activities called practical or laboratory.

In this lesson it was introduced the resource as the filmic material produced by TV Cultura (Channel TV) called “Whence Come?” The character Kika, is a child who has several questions about different things, but it is not understood by adults. The interesting thing is that the cinematic narrative presented shortly following displays Kika receiving an explanation from the objects themselves. There is a personification of these things and elements of nature, a fact widely found and accepted in cartoons and that is usually an important resource used to captivate the attention of children.

From this initial exposure, the teachers reported this as a practice that they usually do with their students using, seedlings as experimental activity (step 3).

It highlights in this episode the initiative to use a filmic resource to reinforce what was had discussed in our prior article, as well as resume some concepts covered in the previous course. From this, testimonies were drawn from of the teachers where they clearly interacted in the community in two ways: positively evaluating the activity of the others and reflecting about their practice regarding the observation and inference.

Steps in 3:05 show the connection between suggest / share intervenes and permeated by one of the topics (inference and observation) of the NoS discussed in the course activity.

Table 2. Transcription of interaction between teachers in steps 3 and 5.

Steps	Transcribed speech
3	T13: So, what you’re talking ((inaudible)) I usually use, for example, with an activity on seedlings ((inaudible)), then I put a set of questions that seeks to address the students’ opinions, questions like: everyone thinks... all think it is important that ... Everyone agrees that... Only then should the teacher resume with the students’ responses. It is a very rich class, but it’s hard. ((The teacher highlights a literature reference that reinforces my speech, specifically in identifying what is observation and inference. Also describes a situation that makes use of this approach, this time one of the teachers asks for an explanation)).
5	T7: Gee, like you could lend me to make an adjustment with my students, because I’m just working with them observing seedlings of beans. I do this every year, but now I see that I’m only on observation, because I had no idea what was inference.

In Table 2, in steps 62 and 64 respectively, was found the teacher that mobilizes NoS knowledge to reflect on education and the teacher who makes considerations regarding the opening of science to critical processes.

It is remarkable to see the analysis by the teacher in step 62, where there is a derivation from the global to the local; the displacement of which was discussed in the course about positivism to a significant situation given by the teacher, in this case, socioeconomic and educational status of children living in bad housing.

It was also identified as a prominent step in various research conducted by Akerson, Abd-El-Khalick, & Lederman (2000) and Bell, Abd-El-Khalick & Lederman (1998) that

address the NoS concepts to teachers. These are the questions asked as part of the aspect that teachers do not always know how to mobilize the NoS in teaching situations or simply downplay the inclusion of this topic in teaching and learning situations.

It was having not found an explicit classroom situation; nevertheless, there is a concern of the teacher with students, including making the judgment that the positivist thinking could lead if it were transposed to the classroom.

Table 3. Transcription of interaction between teachers in steps 62 to 64.

Steps	Transcribed speech
62	T7: That's right, because the same manner as discussed positivism; may have some group of scientists aligned with economic interests that highlight that students who live in slums have never managed to learn same as others because it was scientifically proven.
63	Researcher: You see, in scientific research involving human aspects must be tackled differently, so we talk about qualitative methodology ((I explain a little about this methodology)).
64	T13: Why science must be open to criticism as one researcher told you ((the teacher refers to Karl Popper)).

In this section it will use the Tables 4 and 5 to discuss what has been established between teachers regarding a practical resource sharing to raise students' conceptions about the NoS.

In step 66 (Table 4) Q7 features the ability to record the statements of the students concerning what they think about the NOS with the intent to transcribe the recordings. This can be recognized as significant when soon after, T4 T7 approves the procedure.

What is important in this interaction is the concern of the teacher with students' ideas about the NoS, an aspect that is accepted by another teacher, so there is a concept of teaching, in this case the bias constructivist approach that incorporates the NoS.

The initiative to record, transcribe the speech of students and see the errors, converts the teacher into a researcher of his practical action, Schön (2000), puts its information to analyse the theoretical aspects and the content of the NoS and how these could be incorporated in classroom situations where the questions are specific, localized and peculiarities.

In step 70, the idea of organizing a collective DS is present and a sense of belonging among teachers who identify even acting at different levels of basic education arises. This aspect is significant because it could support the contributions of Vygotsky (2000) with reference to the idea of a more advanced pair, because the same teacher that suggested a build in the DS (didactic sequence) group also highlights the importance of my presence to ask questions.

This situation is discussed by Nóvoa (2009) as a local training about it in relation to Vygotsky (2000). The idea of mediation is significant and a mediator in attendance, along with more experience along with a group of teachers from the same place, would be the ideal situation to advance the issue of the NoS approach in the classroom. Many aspects hinder this action; however, this possibility is not excluded, although it depends on the

extra efforts of scientific research, as it would depend on policies and structural conditions for its implementation.

Table 4. Transcription of interaction between teachers in steps 66 to 70.

Steps	Transcribed speech
66	T7: In my application of instructional sequence I recorded the statements of the students about what they think scientists do and I am quoting the lines.
67	T4: I'll restructure mine, and I think I'll do the same, I will record the lines as the T7 did.
68	T7: It's good, because then we observe where the errors are and may reschedule the classes, I had never done it and enjoyed it. I'll do it more often.
69	Researcher ((teachers exchange phone numbers, curious facts, since they already had the same e-mail)).
70	T4: We could put together a sequence of our group, we do not work with and our classes are different. Another thing, if Edson was available at the school to help people to take the course that show up on time, wait for fifteen days to ask, so I already forgot!

These steps (78 and 79), reflected in Table 5, are remarkably similar to how Wenger (1998) describes fundamental characteristics of a CoP, "these members develop a shared repertoire of resources: experiences, stories, tools, and ways of solving problems, in short a recurring common practice. This takes time and sustained interaction" (Wenger 2000, p. 229).

Again, it finds the concern of teachers to adapt materials and resources to work specifically with the identification of their previous students on the subject of the NoS; the conceptions revealed after that illustrated there was a need to discuss these ideas among members of the CoP. The two excerpts below were taken out of step 79 and show the relevance of the CoP, primarily as support for teachers in order to share practices, ideas, suggestions, etc., or rather the attempt to develop a shared repertoire is remarkable in two sections.

It also has to highlight the role of the teacher as a generator of knowledge, especially in the second stretch. This can be accomplished by proposing a database of patterns with the students' conceptions and compare the responses with theory anticipating it will show the mobilization of important knowledge. Student's ideas will be identified, classified and interpreted in order to make critical use of theoretical contributions and relevant fact, since usually the teachers are merely passive consumers of knowledge produced in the academy.

In this regard, it is relevant to the role of the CoP to the extent that this favors the interactions and reflections of teachers; it is sustained by relationships between equals and recognizes that through common domains of practical and everyday situations in the classroom. Therefore, the theoretical contributions of the academy and the knowledge gener-

ated by teachers, are usually engendered from their practical experience and are narrowed, thus, reducing or excluding the possibility of overlapping one over the other. It highlights these aspects in the data below, especially on step 79.

Table 5. Transcription of interaction between teachers in steps 78 e 79.

Steps	Transcribed speech
78	T4: I would adapt the application of my sequence, even I can use a laboratory experience in discussing about the NoS.
79	T7: People, each one can send what you can get from the students this week for us to discuss during the week. The T5 gave me a text on drawings and representation of children, I will photocopy, I think it will help us because it explains the patterns of representation of students. Each one could send all by email and then we prepare a kind of database standards representations of science and scientists of our students and compare with what is described in theory.

Category coding: Interaction among teachers subcategory: Interaction among teachers with idea and practice and movies sharing (IBTIPM -Movies)

The interactions are again sustained around mutual aid and sharing of information by members of the CoP, alias characteristics of a CoP highlighted on other steps.

There are some implications for teacher education that intend to be discussed in these steps. For example, lack of time and insecurity on the part of the teacher in preparing the DS demonstrated in steps 41 and 46 (Table 6).

These are two variables that must be considered when you want to work with continuous training of teachers because they are intertwined with the structural conditions that may also require teachers' practices. Lack of time can be explained by the need for long work days that are justified due to unfavorable wage conditions.

In cases of uncertainty, the most likely explanation would be that didactic model of teaching by transmission type generators are insecure, in that this type of model, the teacher is the possessor of knowledge, and the student just absorbs the knowledge transmitted exclusively by the teacher.

This insecurity is created because the teacher cannot convey all the existing knowledge and the student also feels inferior for not being able to learn everything; as a result creating indiscipline discouragement and fatigue.

It is understandable that most teachers seeking training courses, by virtue of being "stuck" present similar characteristics, such as the search for models that match the variables mentioned. This also requires us, as trainers, to be constantly vigilant not to let overlapping processes shape the kind of technical rationality, although as was have argued to the impossibility of completely excising this type of training.

In this sense, the importance of CoP is relevant because it allows for the involvement of building with subjects who recognize themselves in the interim practices and models that can be restructured at any time; it can be justified when one of the teachers indicated the use of YouTube.

This recommendation brings elements, albeit incipient, certain autonomy in preparing teaching practices with filmic resources found on the internet, so the placement of this kind of talk in the CoP could help encourage other members, because they are sustained and shared mutual help among the same.

Table 6. Transcription of interaction between teachers in steps 41 to 50.

Steps	Transcribed speech
41	T4: I'm having trouble making a DS, to tell you the truth I never did.
42	T1: We can help you here.
43	Researcher: I printed it and have it here with me, we can use it and we would argue, okay?
44	T4: That's great! That's going to help me a lot!
45	Researcher: Ok, I noticed you emphasized the operation of the microwave, you need to highlight the nature of science and the filmic feature?
46	T4: I could not, and did not have time to think, as you read the summaries, I walked and enjoyed the chapter of the book about educating the look ((book Jose Maria Marina)). Thought of working concepts of physics and how to use a manual, but as you can see I could not systematize best threads on and let my instructional sequence.
47	T9: You can work on two separate fronts or even together, for example, remember when we discussed internal and external aspects of nature of science? Well, you can organize something in this sense, the history of microwave technology, the emergence of the equipment, the social demand for this type of technology.
48	T7: I thought of one thing that can help you T4, you could use advertisements, although I do not remember any equal to that of when Edson used Pantene.
49	T1: It can search any video on YouTube for microwaves, but you will have to be careful to filter things and adapt to what you want.
50	T4: Good idea. I remember of an old commercial that talked about microwaves.

The sequence of steps below (Table 7) shows the concern of the CoP in entering the students' questions during experimental activities or the use of films. Initially, one of the teachers rejects these activities justifying it in the short time as a limiting factor at this point; the researcher discusses with them the possibility to use both resources as facilitators. For example, in formative evaluations of type, it is noteworthy that this type of assessment was unknown to the members of the CoP, for this reason it was necessary for the researcher to explain the concept of assessment and the theoretical foundation contributions of Hadji (2001).

The step from the 121 fragment of speech **“it seems that the film resolves this problem, but we have to prepare”** leads to the belief that there is a recognition that with film you can understand the doubts of the students and also apply formative assessment,

but the teacher shows to be insecure for that. The same teacher at the end of this step adds what Freire (2001) calls as banking education and Mortimer (2006) to discuss the interactions that occur in the classroom, which is the relationship between teacher and student that is mediated by the discourse of authority present in the content, creating a dynamic speech in which the authority of the teacher's discourse with the use of a content overlaps the speech of students.

The recognition that the practice is harmful is pointed out by another teacher, as was determined in part 122 with the following expression: **“It is true that as we make the question, the answer is already ready in our minds and it's difficult to understand the speech of the student.”** Therefore a concern for how to teach using certain features, in this case the experimental activity or movies, is shared amongst the members of the CoP domain.

You can also highlight the reflective thinking of teachers regarding training for the use of such resources, understanding the importance of formative assessment, as well as the students' ideas and finally the recognition that the time would not be a limiting factor.

In this case, it can infer that the disagreement of the teacher with respect to time as a limiting factor in the knowledge foundation has practiced time management in the classroom and even though the term was not conveyed by the teacher, it is likely that such knowledge fits in with what Schön (2000) and Polanyi (1983) called tacit knowledge.

Again, it attributes the importance of CoP as the glue of common identities that are recognized and teachers who identify themselves in their practices. It puts symmetrical relations differently when the trainer is the only source of knowledge and thereby the relations further characterized as the asymmetric type. However, one has to recognize the importance of the trainer and the film resources as mediators in the CoP.

Table 7. Transcription of interaction between teachers in steps 119 to 124.

Steps	Transcription of the speeches
119	T1: Edson, in the case of an experimental activity, we do not have time to pay attention to the students' questions in the movies too.
120	Researcher: That's where we need to change, there is an important idea called formative assessment ((I explain the concept of formative assessment to relate with the experimental activity and the use of films with NoS)).
121	T4: It seems that the film resolves this problem, but we have to prepare for that, I'm still unsure. Another thing I do not agree with is the time issue, I think the problem is that we want students to respond as we want answers.
122	T13: Is it true that when we prepared the question the answer is already ready in our minds and it's difficult to understand the speech of the student.
123	Researcher: Well, it is possible that they express themselves in other ways, for example, through the designs that you apply. I have a proposal with comics we can then discuss ((I leave some references)). For ease you can record lectures and transcribe the speech and then analyze them. You can also place a problem situation with an experiment and movies.
124	T4: I noticed that when I worked with groups I did not allow them to put their ideas out there because it was a concern not to deviate from the content, so every time I restricted the group. But see, the way we work here in the course, I realized how important a moment to express the ideas of the way we think and put myself in the place of the students, because if you continue oppressing our ideas, then I think my doubts will not arise and I don't know why. I went here and read the texts looking for correct answers and realized that the important thing is to ask the questions as well as I need to know to use the films and prepare activities with them in real situations and you will not be there, I need to know how to use, I think it is they call competence.

Category coding: Interaction among teachers subcategory: Interaction between teachers with idea and practice NoS and Movies sharing – (IBTIP-NoS and Movies)

The main concern of the teachers found in Table 8 (rounds 77-79) is to identify the preconceptions of students of science and scientists, so that the CoPs highlight the use of drawings and inserting a lab activity. There is also the need to share all the designs and find patterns for further analysis.

It was established in CoP that the use of films focusing NoS would be used only after prior understanding of what students understand about the subject. Thus the appointment of currently making use of filmic resource is determined by the CoP itself; this choice shows some maturity and professional autonomy to the extent that the decision is generated in the CoP.

Table 8. Transcription of interaction between teachers in steps 77 to 79.

Steps	Transcription of speech
77	T7: Then, only then, would we think it is in the film and which approach would work the NoS, the T4 has less time than me.
78	T4: I adapt the application of my sequence; even I can use to insert a laboratory experience in discussing the nature of science.
79	T7: Personal, each can send what you can to the students each week for us to discuss during the week. The T5 left me a text on drawings and representation of children, I will photocopy, I think will help us, because it best explains the patterns of representation of students. Each could send by email and then we prepare a kind of database standards representations of science and scientists of our students and compare with what is described in theory.

Two important concepts of NoS are found in Table 9, these are: recognition and valuation of women's role in building science; and the questioning of scientific activity restricted to the laboratory. Such concepts were conveyed by different teachers and generated from the appreciation in which members of the CoP attributed to DS designed and implemented by T9.

It is remarkable that the two concepts described above were identified by teachers after submission of DS's T9, and also that some clips from the movie Jurassic Park used in DS teacher's were displayed, however the teachers identified other forms of approaches and possibilities of uses the film could offer and according to their reality. It was demonstrated this in steps 224 and 225.

Again was emphasized that teachers are assigned meanings of uses as well as possibilities of practices with the films. It is possible that these aspects should be strengthened, because there was in this case the value of the collective competence of a typical CoP. This valuation is perhaps best known because it makes the relationship between equal or symmetrical type and between teachers who identify and share common problems.

This argument is based on a critique of the formation processes that are supported by vertical and asymmetric models, with the figure of one who knows and one that needs to absorb knowledge, leaving only the role of the trainer ready to transfer knowledge.

Table 9. Transcription of interactions between teachers in steps 222 to 225.

Steps	Transcription of speech
222	T13: I also learn when you speak, even today, after the T9 spoke of his work I could see something that I do with my students.
223	Researcher: What?
224	T13: The content of the soil, can work fossils and the film he used, gives to address the theme of the program and the idea of women in science.
225	T1: Also, you can work with the students the idea that science is not only made in the laboratory.

Conclusions

It was presented a research to the insertion of the NoS in the process of teaching and learning, however, several lines of research point to the so-called visions distorted by teachers so that these views can influence the work of these teachers and result in the vision of their students.

It also presents in these works that the guidance to the processes of teacher training is not restricted only to the approach of the content of the NoS but that the matter be treated in line with the classroom because it is not sufficient simply to “improve” the conceptions of teachers about the NoS.

That’s it argues that the narrative found in filmic resources used in discussions in a CoP can contribute in the process of continuing education to address the NoS.

In this sense, was developed the idea of methodological support for addressing the NoS, such a proposal is the use of filmic features because as these are embedded in a cultural matrix, they carry meanings and meanings that correspond to the desires of a particular group. However, it is important that the teacher finds potential for its use in certain contexts suiting in degrees of complexity which it intends to discuss with students.

Such action is not an easy task considering the various delegated assignments to teachers; it is therefore elaborate training proposals that consider all these situations.

So in this work it demonstrates that by articulating these three themes it is possible to develop autonomy and leadership of the actions of teachers in that data identified in interactions and practices and sharing ideas.

References

- Akerson, V. L., Abd-EL-Khalick, F., Lederman, N. G. (2000). Influence of a reflective explicit activity-based approach on elementary teachers’ conceptions of nature of science. *Journal of Research in science teaching*, 37, (4), 295–317.
- Akerson, V. L., Abd-EL-Khalick. (2005). How should I know what scientists do – I am just a Kid. Fourth grade students’ conceptions of nature of science. *Journal of Elementary Science Education*, 17, 1-11.
- Akerson, V. L., Donnelly, L. A., Riggs, M. L., Eastwood, J. L. (2012). Developing a community of practice to support preservice elementary teachers’ nature of science instruction. *International Journal of Science Education*, 34 (9), 1371-1392.
- Arroio, A. (2010). Context based learning: A role for cinema in science education. *Science Education International*, 21 (3), 131-143.
- Arroio, A., Fariás, D. (2011). Possible contributions of cinema in natural science education to understand how scientists and Science works. *Problems of Education in the 21st Century*, 37, 18-28.
- Bell, R., Lederman, N. G., Abd-EL-Khalick, F. (1998). Developing and acting upon one’s conception of science: The reality of teacher preparation. *Journal of Research in Science Teaching*, 37, 563-581.
- Bogdan, R., Biklen, S. (1994). *Investigação qualitativa em educação*. Porto: Porto Editora.
- Cohen, L., Manion, L., Morrison, K. (2007). *Research methods in education*, Sixth edition, London and New York: Routledge Falmer.
- Freire, P. (2001). *Pedagogia da autonomia*. Editora Paz e Terra: São Paulo.
- Hadji, C. (2001). *Avaliação Desmistificada*. Artmed Editora, Porto Alegre.
- Lave, J. (1988). *Cognition in practice: Mind, mathematics and culture in everyday life*. Cambridge: Cambridge University Press.

- Lave, J., Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press.
- Matthews, M. R. (1994). *Science teaching: The role of history and philosophy of science*. Psychology Press, New York, NY.
- Morin, E. (1970). *O cinema ou o homem imaginário. Ensaio de Antropologia*. Lisboa: Moraes.
- Mortimer, E. F. (2006). *Linguagem e Formação de Conceitos no Ensino de Ciências*. 1ª edição, Belo Horizonte, Editora UFMG.
- Mosquera, J. J. M. (2008). Aprendizagem, Significado e Identidade em Comunidades de Prática. In: HELENA, M.; ABRAHÃO, M. B. (org.), *Professores e Alunos, aprendizagens significativas em comunidades de prática educativa*. ediPUCRS, Porto Alegre, Pontifícia Universidade Católica do Rio Grande do Sul.
- Nóvoa, A. (2009). Para una formación de profesores construída dentro de la profesión Towards a teacher training developed inside the profession. *Revista de Educación*, 350, 203-221.
- Polanyi, M. (1983). *The Tacit Dimension*. Gloucester/Mass, Peter Smith.
- Santana, E. R., Arroio, A. (2012). The use of audiovisual approach to teach nature of science for in-service natural science teacher's education. *Problems of Education in the 21st Century*, 50, 90-100.
- Schön, D. A. (2000). *Educando o Profissional Reflexivo: um novo design para o ensino e a aprendizagem*. Penso Editora.
- Turner, G. (1997). *Cinema como prática social*. Summus Editorial, São Paulo, SP.
- Vygotsky, L. S. (2000). *A Formação Social da Mente*. 6ª edição, São Paulo, Editora Martins Fontes.
- Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge University Press.
- Wenger, E. (2000). Communities of practice and social learning systems. *Organization*, 7 (2), 225-246.
- Wenger, E., Snyder, W. M. (2001). *Comunidades de Prática a Fronteira Organizacional*. Editora Campus Ltda, Rio de Janeiro, RJ.
- Wertsch, J. V. (1999). *La Mente em Acción*. 1ª edição. Argentina: Aique Editora.
- Zeichner, K. M. (2008). Uma Análise Crítica sobre a "Reflexão" como Conceito Estruturante na Formação Docente. *Educação & Sociedade, Campinas*, 29, (103), 535-554.

Received 10 August 2014; Accepted 14 December 2014



Edson Rodrigues Santana

PhD. Student in Science Education, Faculty of Education, University of Sao Paulo, Sao Paulo, Brazil. E-mail: edsonrodriguessantana@hotmail.com
Website: <http://www5.usp.br/en/>



Agnaldo Arroio

PhD., Professor, Faculty of Education, University of Sao Paulo, Sao Paulo, Brazil.
E-mail: agnaldoarroio@yahoo.com
Website: <http://usp-br.academia.edu/AgnaldoArroio>