INFLUENCE OF SELF-ANALYSIS AND REFLEXIVE PERSCRUTATION OF PRIE-SERVICE TEACHERS THROUGH VIDEO RECORDING IN CHEMISTRY TEACHERS EDUCATION

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Abstract
In this work, we present an approach on methodology of teaching where pre-service chemistry teachers are required to analyze sequences of digital video of chemistry teaching in real classrooms. We utilize discourse analysis to help pre-service chemistry teachers to reflect on their pedagogical strategies and discursive interactions. The results showed that the integration of video analysis on the pre-service chemistry teacher training is an important methodological tool on professional development of chemistry teachers.
Key-words*: pre-service education, video, chemistry teacher, ICT.*
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Introduction

Science education has become an important prerequisite for a vital economy especially with the emerging global economy. Many industrial nations are seeking to improve the quality of science education because of the vital role science and technology play in a nation's economy and standard of life. A teacher is the most important player in science classroom just because of it determines the successful in science education (Nezvalová, 2007).

The problem of educational innovations in chemical education might be properly treated by analyzing the complexity on the basis of methodology of teaching. The pre-service chemistry teacher should have deep knowledge of the objectives on the classes, type of classes, topic of the course, preparation of students and other factors, that influence directly and indirectly the results of the educational process. The pre-service teacher should know theoretically and practically each one the modern methods and to apply them correctly in practice, together with other methods and technologies (Arroio, 2006).

When students feel that they can respect and trust their teacher, they do not only perform better in school but also grow more confident in themselves.

However, teachers usually are not aware or are not able to describe or remember what happens in these interactions with their students. Students who have more secure relationships with their teachers are, in turn, more likely to explore their environment and, therefore to have more opportunities to learn, they display higher levels of language development.

Teachers make a major contribution toward creating a positive learning environment at science classes, particularly trough their interaction or communication with students, and interactions play a fundamental role (Mortimer and Scott, 2003).

The science teacher training should be considered as an important contribution for the improvement of science education quality.

Science education research has show that teachers have ideas, attitudes and behaviors related to science teaching based on their experiences as students (Hewson and Hewson, 1988). The problem is as a non-reflexive experience it reiterates the differences between the goals of curriculum and their practices in the classroom.

Courses on education are totally separated from instruction in content. We are no questioning the need for teachers to have about science content, but it should be important to

improve their knowledge of what and how they are to teach.

A major challenge facing teacher education has been connecting the theoretical body of knowledge presented to pre-service teachers in their schooling with the immediate, personal perceptions that drive their decision-making while teaching (Korthagen and Kessels, 1999).

In recent years, personal reflection in and on action has become a central focus for making change among teachers. Partial justification for this approach is grounded in the assumption that teacher dispositions, evolving from a long history of experience, knowledge, and socialization in schools, play a large role in determining whether teachers will embrace alternative views of classrooms. This kind of reflection is not simply thinking about one's actions. It is a synthesis of theory and practice (Schön, 1983).

Pre-service chemistry teacher bring prior educational experiences and beliefs about teaching, learning and chemical education to their teacher preparation experience. Promote this opportunity to think about beyond this experience could support them to questioning their knowledge, different aspects of teaching or about assumptions.

At the first moment, pre-service showed be supported to develop this kind of reflective action. Some guided activities can help them on this reflective process. Based on this way they could change some beliefs and practices based on this reflective process. In general, talks seem really related to this process, they can discuss about, and they can write about or other activities. But doing it using video seems to propose a more intense process because there is more information to consider during the reflection.

We can assume that the video-recorded is a document with much information about the real context of the teaching and learning. It is possible to recover the event with all the complexity.

The significance of talk between students and their teachers, and between students, is recognized. Socio-cultural theories of learning draw on Vygotskian theory can provide a way of considering these issues in terms of the way ideas developed on the broader social plane of the classroom may be appropriated by individual learners (Lemke, 1990).

Based on video-recorded-stimulated-reflection pre-service chemistry teachers can analyze their performances, focused on individual's behavior, collaborative work with other pre-services teachers, interaction in the classroom, communication with students. So, they can have a feedback from their performances as a teacher. Remember that this feedback is aimed at increasing a performer's awareness of strengths and weakness in the discussion of reflective practice in teaching.

Methodology of Research

The strategy to obtain these episodes involved recording some series of chemistry classes. The recorded classes were offered by groups of pre-service chemistry teachers from the discipline Methodology of Chemistry's teaching during the second semester of 2009, at Faculty of Education (University of São Paulo - Brazil) to high school student.

These videos were given to the pre-service teachers and each one wrote a report containing, between many aspects, their experiences of watching theirselves in classroom and their self-evaluation as teachers. In this article, we shall use the individual reports alone as analysis data.

Results and discussions

In the course of the reports, various episodes were described by the pre-service teachers about the classes: their performances as teachers and co-workers, which themes were worked, what were the students' answers, and many others. However, in most of the

cases, only when they were induced to talk about the recorded class, the self-analysis and the reflexive perscrutation of their own actions appeared with greater consistence.

Initially, great deal of them said being intimidated or uncomfortable by the mere presence of the camera, or by the fact that they would be watched by the colleagues and professor. Others felt awkward towards their own image in video, not identifying it as theirselves:

> *„However, when I faced new students with a camera behind me knowing that it would latter be shown to the whole class, I felt insecure about using a new method at that moment [...].“*

> *„All seemed awkward. The appearance, the voice, the behavior, looked like another person, because we weren't used to watch ourselves in a video.“*

Nevertheless, in all the reports some bits of self-analysis popped out, and the change of focus – from „who“ is doing something to „how“ this someone is doing and „why“ – when they say, e.g., that they noticed facts about theirselves and about their classes that were unknown, like their teaching methods, the mistakes (as they said) made, the possibilities in which there would be another ways of – mode adequate to the situation or – and their posture before the students.

> *„The video was a very useful tool to measure how much I, and the other teachers, were interfering in the discussion between the groups, and how was this interaction: if by any chance we've cut what the student was about to say, if we were repetitive, of we gave more attention to one student more than to others, how many times we called the more evasive student to discussion, etc...“*

> *„I could notice that in certain moments I ended up expressing myself badly, using terms that weren't clear. I realized that I talk too fast, and that this is a point in which I should get better.“*

We can notice that the use of video to stimulate reflection support them on observing themselves. There are some evidences of the ability of reflection, it facilitated deeper reflection when they self-evaluate. We know the self-evaluation is not an easy process, but when it is done based on your own images this process is more complex because they can develop deeper self-knowledge they notice how their beliefs and ideas can shape their teaching practice on the classroom.

> *„It's obvious that the recording in video and in audio is extremely proficuous for the development of teaching methods.“*

> *„In didactic terms I can say I'm satisfied with my performance, more than before the video, despite believing that I need to change a bit the matter of posture before the students...“*

There were even cases of meta-evaluation, really frequents indeed, moreover, in which the pre-service teachers describe the audiovisual resource as a potentializer of self-analysis and as an instrument that facilitate cases of noticing specific facts to clear not well understood episodes. A great deal of the pre-service teachers also include the prowess of the resource against the simple self-analysis based on memories alone, which have only one point of view, quite subjective, and internal to the event. The recognition of the possibilities of the resource by the pre-service teachers is a fundamental step to the establishment of the same as a tool to stimulate reflection on teachers' formation (Wang and Hartley, 2003). Even

if someone with a partial vision of the whole – being totally immerse in the process, not having an outer vision – realizes the huge difference between the simple use of memory and the taping, it's usage for self-analysis turns out almost imperative:

> *„This methodology of recording your own class is valid and efficient, for the experience of being able to see and really observe the concretization of your own actions was really good, mainly by the fact that it's important to self-analyze constantly."*

> *„With the help of our classes' videos, we could witness in fact what happened and how, which was very important for clarifying doubts that happened during classes."*

> *„In the other hand, the experience of being seen on tape was much more constructive than a self-analysis based on memory."*

The importance of recording, for the pre-service teachers mainly, is not only on self-analysis, but it is also a resource to notice the interactions that occur during class (Van Zee and Roberts, 2001; Sherin and van Es, 2005) and have better notion of student's influence in class, their posture before the teacher and general behavior.

Many teacher go out from pre-service courses without knowing how a real class is, how is the students' behavior and how is the student-teacher interaction, having with them just many theories (Carvalho, 2000). The accomplishment of internships – with interventions – or mini-courses helps with the interaction with the real world and it's firsts paths, and their recording multiplies the possibilities of extracting information of how a class is, by giving the chance of notice facts that were not seen and watching the video over and over, to focus in different points.

> „It was also possible to notice how the original script was modified by the interaction with the classroom. *The students are a moving organization that also tells, sometimes, how the course goes."*

> *„As an example, why do students associate the techniques we give as examples as a definition?"*

> *„The taping can show us IF the students were or not interested or involved with the class proposed by the teacher. Generally, when the teacher is clarifying some students' doubts, he/she hardly pays attention to what's around with the other students. But a camera can register what happens in all space of a classroom."*

The great potential of this method is the possibility of analyzing what are the effects of an image and, mainly, of the gestures of the teacher. Many underestimate this effect, although it is of great importance in learning as a focus point of attention and helper on formation of abstract concepts (Martins, 2006).

Human Behavior expresses communication and emotion principally through nonverbal cues and actions. When observing social interaction, we have to pay attention on the nonverbal language also, because all behaviors that are involved in the transmission of experiences or information from one person to another (Siegman and Feldstein, 1987). And this is not unnoticed by the eyes of the pre-service teacher when analyzing theirselves and their acts:

> *„The observations made with the video bring many aspects that I'd never even realize during the activity, mainly gestures, which can say much about certain evaluations we supposedly don't do."*

Pre-service chemistry teachers bring preexisting educational experiences and beliefs about many aspects involved in teaching, that influence their practice in a way to create deeply ingrained schemata that can be difficult to change (Feiman-Nemser, 2001).

The reflection when effective can help them as a means to reconstruct these prior beliefs and refine their pedagogical thinking by a retrospective thinking as we can notice these evidences from pre-service's written reflections.

> *„Another important aspect in video analysis, also related to gesture and visual language, happened during the beginning of the class, when Daniel asked the students what was happening in the images of the projection. The students, not understanding what he was talking about, started answering about another part of the picture, and not about the separation process that the images showed. Noticing this, Daniel started pointing towards the direction where the attention of the students should be, and then we started having answers more focused on our goals."*

We can notice some evidences about their critical reflection, for example some changes on their beliefs and ideas. The situations analyzed are really close to them it seems more authentic and personalized teaching event.

They are thinking about what students think. As we can see this activity support them to develop pedagogical understanding of different learners, they learn how to observe and interpret student's learning, how to interact with students and for sure change how they can reach the students, how they can teach them.

Many pre-service chemistry teachers are challenged by the discrepancy between the new programs and reforms on education and their own learning experiences with traditional pedagogy that they faced as students.

The educational teacher´s program should try to help pre-service teachers towards a contemporary view of teaching and learning chemistry, because it seems to require new experiences in learning natural science that emphasize discourse in classrooms, by this way it requires support from collaborative communities of practice.

It is necessary to provide them with experiences such learning environments, because these experiences are able to help them to translate their theories into classroom practice (Lin, 2002).

Reflective teaching should be managed considering authentic situations and social interaction on the classrooms. The video recorded-stimulated-reflection implies the potential of improve the reflective practice and for sure the ability to reflect based on self-evaluation. Because this process of viewing and analyzing authentic events provide individual experience for the pre-service teacher and more, it generates new educational perspectives by connecting the analyzed situation with previous experience and helps them to open their minds, as a critical thinker, engaging them to have autonomy to propose new possible ways of teaching and learning.

Implications

If we want to raise the quality of chemistry teaching and learning, it is important to know more about what happens in classrooms. Videos-stimulated-reflective-dialogues give us the chance to get an inside view, but even more they are a valuable tool to make pre-service teachers reflect upon chemistry teaching and learning process.

On this way, digital videos can be used to initiate reflective processes and support the discursive interactions analysis of the classroom. This tool supports them to develop their abilities to notice, analyze and interpret chemistry classroom interactions because it is based on self-evaluation and reflection on authentic teaching.

We consider discursive analysis an important tool to foster the professional

development of teachers. In our point of view, learning as a social process, all participants are jointly responsible during these activities. We use digital videos to make pre-service chemistry teachers reflect upon their pedagogical strategies and discursive interactions, which pre-service teachers and their teachers can use to reflect in a collaborative work about what happens in chemistry class, what indicates quality, what about their own learning process and which improvement might be necessary.

The results showed that pre-service chemistry teacher got more motivated and involved when they have the opportunity to analyze their own performances as teachers at the chemistry classroom instead the others performances. In this sense, the integration of video analysis of the classroom's practices on the pre-service formation is an important action to help them on their professional development promoting reflection (Arroio, 2007).

The integration of digital video into the research process that would facilitate and support classes in which teachers and pre-service chemistry teachers jointly analyzed digital recordings of lessons in order to build theories of teaching and learning. Pre-service chemistry teachers are of course present in the collection of the data but are often less likely to be involved in the analysis of the data. Using video-stimulated-reflective-dialogues to promote reflection seems to help pre-service teachers to reflect on their own teaching and they are supported to construct their own meaning of teaching practice. Working in this way, help them to transform research findings into practical action which has an immediate impact on classroom practice and pedagogy.

Video-stimulated recall works as an important tool for reflection, because it provides pre-service teachers with the real context to observe and reflect on different issues of teaching and learning (Abell, Bryan and Anderson, 1998).

On this way, digital videos can be used to initiate reflective processes and support the discursive interactions analysis of the classroom. Video-stimulated-reflective-dialogues offer from the socio-cultural approach of teaching and learning, a high level of potential for the professionalization of teachers, and represent a very practice tool for implementing the demands of an effective pre-service chemistry teacher training.

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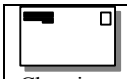

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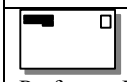

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