

CURRICULAR TRANSFORMATION AS CONTEXT TO SHARE PRACTICES: A CASE IN THE PORTUGUESE SCHOOLS

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This article emerged from a larger study of professional practices of mathematics teachers. It addresses the concept of practice discussing the balance between the collective and individual component of practices and its implications to comprehend some transformations and consolidations of mathematics teachers practice in the Portuguese contemporaneous context.

THE CONCEPT OF PRACTICE

Professional practices of mathematics teachers have been analyzed in the literature emerging from the discussion a concept of practice that includes a collective and an individual component. Saxe (1999), for example, draws our attention to the collective characteristic of practices when he defines practice as "recurrent and socially organized activities that permeate daily life" (p.121). From this definition the concept of practice involves not only the existence of a group but also implies that the group is the builder and organizer of practices. Moreover because practices are 'recurrent' over time, they hold a place in the identity of a particular social group. Another perspective that highlights that practices are allocated by collectives is presented by Ponte, Quaresma & Branco (2011) when they argue that practices of mathematics teachers are co-constructed by colleagues and students.

In addition to the social component of practices that allows a member of a social group to identify and recognize activities as belonging to a particular practice, there is also an individual component. Namely Ponte & Chapman (2006) pointed out the context, the meanings and the intentions that each teacher brings to his/her practice. Thus, the notion of practice incorporates both a collective and an individual component performed by a set of actions and words where simultaneously innovation and novelty take place.

Barnes (2000), for example, with the purpose of presenting the meaning of "shared practices" as forms of activity associated with a collective, enlarges the concept by introducing the individual level as positions for the regeneration of practice:

Shared practices are the accomplishments of competent members of collectives. They are accomplishments readily achieved by, and routinely to be expected of members acting together, but they nonetheless have to be generated on every occasion... Although they are routine at the collective level, they are not routine at the individual level. (2000, p. 32-33).

In this frame, the “shared” characteristic is constitutive of a practice along with its heterogeneous characteristics as well as the complexity of the cultural material involved in its "sayings and doings" of a particular member of the collective. Due to the intertwined presence of these two dimensions in the performance of practices, several authors prefer to discuss the concept of practice in close relationship with the context of the professional field where practices are carried out (Knorr-Cetina, 2000). This perspective is also put forward by Ponte & Chapman (2006) that mention that to understand the professional practices of teachers of mathematics, it is necessary to take into account "the social context of the structure and its many layers - classroom, school, community, educational and professional structure and social system "(p. 483), and by Ponte, Quaresma & Branco (2011, p.26) that consider the following aspects to analyze practices: teacher's motivation, the educative social context, the classroom context, teachers' professional knowledge, teachers' expertise and teachers' reflexive capacities.

METHODOLOGY

We present an episode taken from a broader teaching experience for the topic of Statistics. This episode took place in May - June 2010, during 13 blocks of forty-five minutes (the time indicated by the annual school planning, for this topic).

Data was collected and videotaped in its natural environment. In addition, some of the small groups work was audiotaped. Some details to future memory to allow and support the reflection after the classes were recorded by the teacher in a field diary. The registrations included students' speeches, ideas, reflections, interpretations of arising situations, notes for future developments or adaptations of the proposed tasks, feelings and perceptions that the teacher was gathering informally along with observation about particular student, or groups or interaction they had with them. The episode is analyzed taking into consideration the key aspects to the study of the professional practices of mathematics teachers referred above by Ponte, Quaresma & Branco (2011, p.26).

THE SOCIAL AND EDUCATIVE CONTEXT

Recent political conjunctures have introduced changes in the Portuguese curriculum of mathematics (Ponte et al, 2007), and consequently it is important to consider the impetus in the pedagogical and organizational levels of school and classroom activities that implies a new cultural posture towards curriculum implementation and requires conceptual and technical knowledge, different from the traditionally one. The measures that have been lately undertaken have reflexes in the schools, as institutions, but also in teachers, as individuals interpreting a new mathematics curriculum. As a result of these curricular measures, that unrolled different forms of being, knowing and learning, and that engraves a set of dynamics,

it is possible to observe the emergence of different practices, along with the varied meanings that they acquire. Furthermore, participation and construction of new practices as well as development of older ones imply new actions or the recontextualization of older ones.

Indeed, the new Math Program, approved in December of 2007, brought changes both in terms of the distribution and depth of content. In particular, Statistics is presented as a reinforced theme in all cycles of basic education, even at the 1st cycle. It emphasizes an increasing complexity of data to analyze, which affects the using of measures of central tendency and dispersion. The representation of data in the form of frequency tables or graphics is deeper and the tasks focus on studies of planning and analysis of statistical data, provided or collected, are encouraged and valued. The notion of sample, as well as the measures of dispersion, is now more important.

CLASSROOM CONTEXT

The teaching was implemented in two mathematical classes in a school in the city of Oporto: one class, with 27 students, quite heterogeneous, both in terms of school success and behavior and another class, with 19 students, with a slightly lower level of success, and integrating a student with Special Educational Needs.

Because the teacher had been teaching these classes in the previous year she was aware of both students' behavior and their mathematical skills. Therefore the class planning took into account students' prior knowledge.

The teaching began with a dynamic participatory lecture, supported by the use of multimedia presentations and a spreadsheet, whose goal was the revision of concepts and statistical procedures. This was followed by the presentation of the platform "CensusAtSchool" (<http://www.censusatschool.org.uk/>). The main features of the platform were presented to students, in terms of: statistical tools to support the planning of statistics, pre-designed questionnaires, and the real data that it provides. The teacher opted for this platform since it met several capabilities such as real databases created by students of international schools, interactive applications for the classification of variables and graphing, and some questionnaires used elsewhere. The only apparent disadvantage would be the English language used in this platform. However, this aspect did not constitute any obstacle, rather was seen as a positive factor, since students overcome difficulties with the occasional help of a dictionary or the teacher.

Then, the students, organized in groups of 3 to 5 elements, went to the library where they had the opportunity to explore the platform, classifying variables given its nature, and graphing, according to data to be processed. Later, students were asked to choose one of the available questionnaires that integrated several variables such as: weight, age, height, favorite color, the foot length, or means of transport on the way to school. After some hesitation and discussion, each group selected a questionnaire that was photocopied and then answered by all members of the class - the sample considered.

TEACHER'S REFLECTION

The reflection of the teacher firstly highlights that more than changes in the content and procedures are changes in the teaching of statistics that is an enabler of scientific and academic growth of students. Although the use of technology was already incorporated in her professional practices as both a valuable tool to motivate students' learning and to support students' mobilization of statistical knowledge, the decision to use real data and the new technologies, including the spreadsheet, indicates that the teacher attributed a high real meaning to the new mathematical program and its methodological requirements to innovation. In fact, the requirements of the new program provided a new feeling of empowerment to hers practices as well as a context to attach new meaning to them.

In addition, the teacher is more comfortable in the role of doing a "reformed teaching" (Boaler, 2003) and consequently is more motivated to innovate at the level of classroom practices because she is aware that the incorporation of innovation into practices is now legitimized at the level of schools by the context presented by the new program, by this way creating a new possibility to share a collective dimension of practices. Moreover, teacher's expectations were confirmed to the extent that a critical sense of observation, favoring a contextual stimulation of statistical thinking and competence were encouraged.

FINAL CONSIDERATIONS

Professional practices of mathematics teachers have been analyzed in the literature emerging from the discussion a concept of practice that on the one hand reflects a collective component, which we characterize as a regularity that ensures its place among the activities of the social group identity through time, and on the other hand, expresses a component of teachers' individuality by presenting the possibility of the practice to be completed and implemented by teachers' singular actions and words.

In the social context described above, the new program is an important ingredient to improve teachers practice namely because it legitimizes innovation. Having a social and school context that faces changes in the curricular implementation as a safe step toward the improvement of students' learning is a new challenge that empowers teachers' necessities to express themselves throughout their practices. In addition it supports the development of a sense of belonging to a community throughout sharing practices that are completed or interpreted by the individuality of each member of the collective in a different way, generating a new balance between the collective and individual component of practices.

Finally, we would like to emphasize the reflection triggered by the incorporation of new elements into an already existing practice that, although keeping the core characterization of the practice enables its transformations and trigger reflections on the need for different approaches in the teaching of mathematics.

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