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General Poster Session during Lunch

Time:2012-09-19
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Room:FCEE - Poster Exhibition Area

Contribution

"Do You Think This Is Really True?". Dealing With Investigative Work In Maths Class.

This poster reports on a teaching experience, developed in the context of a Mathematics in-service teacher education program (Canavarro & Rocha, 2008; Darling-Hammond, Wei, Andree, Richardson & Orphanos, 2009), aiming to know how teachers integrate investigation tasks in the curriculum development and how they reflect upon their teaching practices.

The dynamics of the Mathematics class is highly influenced by the proposed tasks, because they can provide different ways to *understand* or *do* Mathematics. Problems and investigations appear as expressions of a non-routine work, referring to complex mathematical processes. Although the two concepts are considered very close, they can fulfil different functions (Chamoso & Rawson, 2001). "Problem solving" refers to a convergent activity in which one tries to achieve a solution to a problem, using appropriate strategies and techniques, while "investigation" is seen as a more divergent activity that encourages someone to be curious, to search for alternative strategies, to consider what would happen if certain conditions change or to generalize the situation.

Obviously that a situation, in the abstract, can have the characteristics of an investigation (Ponte, Oliveira, Cunha & Segurado, 1998) and its exploitation in the classroom can twist out, in practice, these characteristics. Thus the teacher's role in the class organization and management is determinant, in order to lead students to conjecture, explore examples and counterexamples and justify the conjectures based on mathematical arguments. Assigning a central role to the argumentation in the classroom means empowering all students to present and explain their reasonings, but also to understand and accept the argumentation of the others (Boavida, 2005).

Under these conditions, a Mathematics teacher is confronted with an increasing demand in his work of preparation and conducting classes (and, mainly, the proposed tasks and their exploration) and the consequent decision-making. Being a teacher requires a very diversified and complex professional knowledge, especially the one linked to the teachers' characteristic knowledge, the didactic knowledge (Pires, 2006). This knowledge is related, for example, to the integration of Mathematics in the school reality or to the instructional process ? planning, conducting and evaluation of the teaching procedures. As Shulman says (1986, p. 9), ?it is pedagogical knowledge, which goes beyond knowledge of subject matter per se to the dimension of subject matter knowledge *for teaching*?.

But the teacher's knowledge, in particular the didactic one, develops essentially through reflection on his practice and interaction with other teachers. This practical knowledge, resulting from the integration of both theoretical and experiential knowledges, has a contextualised nature, is modeled by the teacher's intentions and own conceptions and it is knowledge in action (Elbaz, 1983; Schön, 1992). For Hiebert, Gallimore and Stigler (2002), this is a very useful knowledge because, while connected to the practice, it evolves in response to specific problems of that practice.

Method

This experience focuses on the whole teaching cycle (preparation, class conducting, and reflection) of Margarida, an experienced 5th grade Mathematics teacher in a class of twenty-five students, exploring an investigation task about the Pascal triangle. The study follows a qualitative and interpretative approach (Bogdan & Biklen, 1994; Bolívar, Domingo & Fernández, 2001), seeking to understand the teacher's point of view, how she interprets the different experiences she is dealing with and the meanings she assigns to them. The data collection was supported by: (i) transcriptions of episodes during the training sessions and in the classroom; (ii) teacher's written productions; (iii) written productions by the students while solving the tasks; and (iv) field notes recorded by the author, in particular, in the classroom and in the reflection sessions. The data analysis process involved a floating approach and continued with a systematization, seeking to give a coherent ordering to the various materials and leading to the establishment of classifications and categories (Bogdan & Biklen, 1994), involving negotiation of meanings with the participant teachers.

Expected Outcomes

While planning the main concerns of Margarida were the search and anticipation of the conjectures that the students could formulate, due to the unpredictability and diversity of the possible paths and the consequent possibility of not being able to respond appropriately to them. Margarida faced up to challenges in the classroom management resulting from the nature of the task, from the presentation to the students, but especially to aspects related to the formulation, validation and discussion of conjectures and to the systematization of the related mathematical knowledge. After the classes Margarida highlighted the increasing relevance that she began to assign to investigations in her practice and in the curriculum development. She

recognized the advantages of their integration into the mathematical topics approach, although predicting some trouble in time management for the task. She considered that investigations helped all the students, especially those who had presented more difficulties, because their divergent nature allow personal processes based on the previous knowledge and more meaningful for them. Margarida also enhanced that the dynamics of the training program helped her to include investigations in the classroom and to overcome the difficulties in the several stages of the teaching cycle.

References

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